ABSTRACT

Title of Thesis:	SAFETY THROUGH COMMUNITY IN HIGH SCHOOLS
	May La Pyeit Sein Win, Masters of Architecture and Community Planning Degree, 2017
Thesis Directed By:	Lecturer, Michael Binder, AIA, LEED AP BD+C

"Safety through Community in High Schools" started out as the result of a long-time fascination with the educational system in the United States and the contradictions that exist within it. One such contradiction is the attempted inclusion of the greater community within the physical realm of the school—through the allowed use of an auditorium, for example—while simultaneously advocating for physical barriers and checkpoints which foster an air of distrust. Another contradiction on a smaller scale relates to a premise that students function best when exposed to natural sunlight. However, the need for security—elevated by the increase of mass shootings—has influenced many public schools to build with small windows, which restrict natural light and often make for an oppressive environment. This thesis aims to bring forth a design which arises out of thoughtful explorations of such contradictions between community, security, and stimulating learning environment.

SAFETY THROUGH COMMUNITY IN HIGH SCHOOLS

by

May La Pyeit Sein Win

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Masters of Architecture and
Urban Planning Degree
2017

Advisory Committee:
Professor Michael Binder, Chair
Professor Alexander Chen
Professor Brian Kelly
Professor James W. Tilghman

Dedications

I would like to dedicate this paper to my parents, Dr. Sein Win and Daw Si Si Thwe, who always set an example of hard work, honesty, and empathy that I strive to reflect in my architectural design.

Acknowledgements

I would like to thank Professor Michael Binder for his guidance through my thesis process. I would also like to thank Professor Alex Chen for making sure that the community is always at the heart of my thesis. I would like to thank my classmates, Adam Louie, Qiansen Yang, Matthew Bender, Anne Kopf, David Leestma, and Charishma Hunjun, for their help and contributions. I would also like to thank the security personnel and the principle, Ms. Torrie Walker, at the Fairmont High School for personally showing me around the school.

Table of Contents

List of Figures

Theories on Education

Education has been a contentious topic in the United States as the government grapples to find a way to fix the continually mediocre ranking of the country's education system compared to the world. As the government channel more money in order to prop up test scores and graduation rates, the more nuanced side of education which involves the community and the built environment continues to recede to the background. In addition, the more frequent instances of school shootings had brought security to the foreground, establish security as one of the main factors in school architecture. This thesis analyzed literature which addresses not only security but also the more nuanced, but equally important, aspects of community and the classroom environment. What emerged are the three sets of diverging, though not necessarily mutually exclusive, theories of education as it relates to community, security, and the classroom environment. The three main ostensibly opposing set of theories are:

1. A school acts as its own ecological system, which operates the best when separated from community.[1,2]

   Vs.

   The welfare of the school is inextricably linked to its community, and thus the school should actively serve the community to be healthy.[3]

---

[1] Nance, Jason P. 2013. "STUDENTS, SECURITY, AND RACE." Emory Law Journal 63, no. 1: 1-57. Academic Search Complete, EBSCOhost (accessed December 2, 2015),: 17

[2] Prince George's County Public Schools, "Prototype High School Educational Specifications*" Prince George's County Public Schools*, February, 2015,: 8 http://www1.pgcps.org/cip/index.aspx?id=207464. accessed October 5, 1015

[3] Lindle, Jane. 2008. "School Safety." *Educational Policy* 22 (1): 38

2. Its main focus should be to promote the mental welfare of students, such as creating an environment which reduces stress.[4,5,6]

   Vs.

   The recent escalation of active-shooter scenarios justify a design that anticipates and prevents immediate harm to the students.[7,8]

3. School should have an open "flexible" plan that allows students and teachers the autonomy needed for an interactive and stimulating learning environment.[9]

   Vs.

   Traditional activity-specific classroom should be maintained because it insulates teachers and students from distracting stimuli.[10,11]

All theories listed above arise because of changing social, economic, and physical conditions in the United States. Although all have their own underlying causes, not all are equally supported by scholastic studies and data. Thus, it is important to recognize that one theory's set of ideas—and its physical implications—

[4] Timm, Paul. *School Security: How to Build and Strengthen a School Safety Program.* Saint Louis: Elsevier Science, 2014. http://UMDCP.eblib.com/patron/FullRecord.aspx?p=1793945 (accessed December 03, 2015): 7
[5] Nance, "STUDENTS, SECURITY, AND RACE." 19
[6] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 3
[7] Kaiser, Laura Fisher. 2013. "Tackling Safety Through Design." *Architectural Record* 201, no. 3: 38. *Business Source Complete*, EBSCO*host:* 1
[8] Kaiser, "Tackling Safety Through Design." 11
[9] Smith TJ. 2007. "The ergonomics of learning: educational design and learning performance." Work *(Reading, Mass.)* 50:10, 1530-1546, DOI: 10.1080/00140130701587608. PubMed (accessed December 2, 2015).: 1535
[10] Cotterell, John. 1984. "Effects of School Architectural Design on Student and Teacher Anxiety." *Environment and Behavior* 16 (4): 455-479.: 455
[11] Cotterell, "Effects of School Architectural Design on Student and Teacher Anxiety." 468

may have a higher probability of positively influencing the learning environment than another.

1. "School-centric" vs. Community Involvement

The two main theories on how the school should relate to the community are focused on how the school defines its boundary and how its building is configured to include or exclude the community.

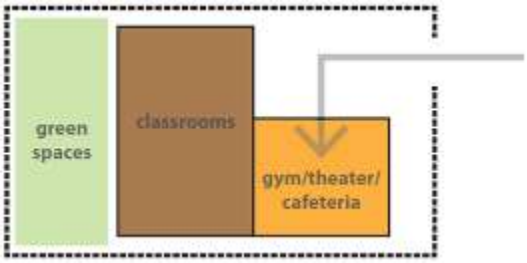


Figure 1: Typical layout of a "School-centric" model
Diagram by May Sein Win

The school-centric view advocates for the school to be separated from the neighborhood through the use of physical barriers. The divide between the school property and its surrounding is derived from "empirical evidence [which demonstrates] that schools remain among the safest places for children."[12] Thus, the school is seen as a safe haven, seperated from the community, to be defended at all cost.

Although most guidelines stress the need for the public to be able to use special programmable spaces—such as the gymnasium, cafeteria, or auditorium—it advocates for those spaces to be markedly seperated from academic classrooms.[13] This allows access to academic areas to be blocked off for security reasons after

[12] Nance, "STUDENTS, SECURITY, AND RACE." 17
[13] Prince George's County Public Schools, "Prototype High School Educational Specifications" 8

hours, when the special programmable spaces are in use by the public. This also insolates the classrooms from the special programmable spaces which tends to have high noise output. [14]

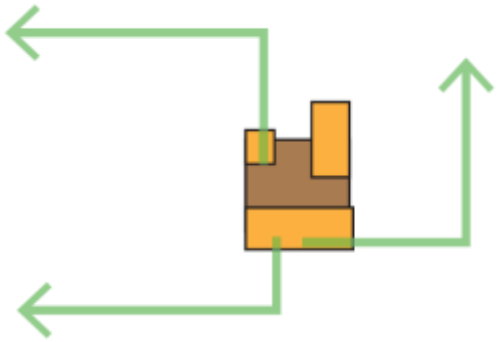


Figure 2: A community-involvement model aims to spread the special program spaces (orange) throughout the classrooms and administrative areas (brown).
Diagram by May Sein Win

A diverging, though not mutually exclusive, theory maintains that a school functions the best when it serves the community, because the school is in fact part of the community. This view maintains that the "school support mechanisms should extend to and from the neighborhoods and communities beyond school walls,"[15] and the school board, architects, and other stakeholders should not just resort to fencing off the school. Many schools districts, including Prince George's County, advocate allowing the neighborhood to use some spaces in schools due to the apparent financial advantages.[16] Some literature goes further than just providing the spaces for community and ask how these spaces can be well-integrated throughout the school, and not simply isolated to one side of the school.

[14] Prince George's County Public Schools, "Prototype High School Educational Specifications" 5
[15] Lindle, "School Safety." 38
[16] Prince George's County Public Schools, "Prototype High School Educational Specifications" 10

2. Treating the Causes of Violence vs. Preventing Immediate Harm

There is a concern among many academic scholars that the focus on security as it relates to the scenario of an active shooter[17]—and the strict security measures which come along with it—"undermine the climate of trust needed to effectively educate children."[18] They advocate that architects should focus on more prevalent forms of violence—bullying "occurs once every seven minutes"[19]—and look for the underlying causes of that violence. Paul Timm points out in his book *School Security: How to Build and Strengthen a School Safety Program* that "the average high school kid today has the same level of anxiety as the average psychiatric patient in the early 1950's."[20] Given this alarming trend, he maintains that the architects should design for the mental well-being of students.

In contrast, the focus of creating active methods of deterrence comes as "the country [is] grappling with how to marry 20th-century environments with 21st-century technology and make our school safe."[21] The rise of violent incidents and the increasing concern among parents are used to defend the legitimacy of allocating resources into strengthening school security. Prince George's County Public Schools (PGCPS) supports this view, as their guideline recommends the use of security cameras and smaller windows to deter intruders.[22]

[17] Kaiser, "Tackling Safety Through Design." 2
[18] Nance, "STUDENTS, SECURITY, AND RACE." 19
[19] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 3
[20] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 7
[21] Kaiser, "Tackling Safety Through Design." 1
[22] Prince George's County Public Schools, "Prototype High School Educational Specifications" 15

3. Open "Flexible" Plan vs. Closed Program-Specific Plan

The advocates of the flexible plan state that "there is a deep chasm between the ideal of self-regulation of learning proclaimed by educational psychology, and…learning environments that typically prevail."[23] To fix this chasm, some designers turn to the principle of "matching the environment to the requirements of the person (child) through moving items in the environment and by moving themselves to minimize discomfort and enhance comfort and performance."[24] In this system, schools are designed with movable walls and furniture that allow students and teachers to create spaces that are best-suited to their learning or teaching style [Figure 3].

Figure 3: Typical plan of an open plan classroom. Each color represents the a specific classroom activity and the open plan allows these activities to overlap.
Image underlay by John Cotterell
Diagram by May Sein Win

[23] Smith TJ. "The ergonomics of learning: educational design and learning performance." 1535
[24] Smith TJ. "The ergonomics of learning: educational design and learning performance." 1531

By contrast, the 20th Century model of schools has classrooms which are separated by permanent walls and are reserved for a specific program [Figure 4]. One main benefit of this model is that it provides acoustical insulation, which decreases auditory distractions, as well as gives a greater control over the amount of visual stimuli presented to students.[25] This is important because an "individual functioning is depressed where the information available exceeds the person's capacity to process it (overload condition)."[26] In addition, a study brought forth by John Cotterell in a paper titles "Effects of School Architectural Design on Student and Teacher Anxiety" found that "teachers in the conventional classrooms seemed in better personal control of their behavior."[27]

Figure 4: Typical plan of traditional 20th century classroom. Each color represents a classroom activity and in this plan, each activity is strictly contain by the classroom walls.
Image underlay by John Cotterell
Diagram by May Sein Win

Current Methods of Security

The security-enhancing strategies currently used by public schools in the United States mainly rely on physical characteristics. According to Timm, these physical measures could be categorized, based on use, into five groups: deterrence, detection,

[25] Prince George's County Public Schools, "Prototype High School Educational Specifications" 17-18
[26] Cotterell, "Effects of School Architectural Design on Student and Teacher Anxiety." 457
[27] Cotterell, "Effects of School Architectural Design on Student and Teacher Anxiety." 747

communication, delay, and response.[28] While much of the public, administrative, and literary focus is on security methods as it related to outside intruders, it is important to recognize that mitigating disturbance within the school by students is also crucial in achieving a safe and secure school. The following sections will outline various strategies which schools could use to address potential threats in the vicinity of the school and within the school.

Deterrence

This method aims to discourage potential criminal behavior through the clear and explicit presence of security features. Such features include security officers in lobbies, exterior signs, bright exterior lighting, fencing, and video cameras.

Layout of the Site

Site layout is integral to deter criminal activities in the vicinity of the school and to discourage potential criminals from entering the school. Steve Turkes, a principle at Perkins+Will, states, "We need to think more about the perimeter of the site or a building as a point of deterrence."[29] Crime Prevention through Environmental Design (CPTED) also emphasizes the need for the site to act as "concentric circles of protection" through the combined use of "physical barriers and security systems" (Figure 5).[30]

---

[28] Timm, Paul. *School Security: How to Build and Strengthen a School Safety Program.* Saint Louis: Elsevier Science, 2014. http://UMDCP.eblib.com/patron/FullRecord.aspx?p=1793945 (accessed December 03, 2015):80

[29] Kaiser, Laura Fisher. 2013. "Tackling Safety Through Design." *Architectural Record* 201, no. 3: 38. *Business Source Complete*, EBSCO*host:* 1

[30]Kaier, "Tackling Safety Through Design." 1

Figure 5: Suggested use of foliage by PGCPS that maintains clear line of sight to discourage intruders.
Diagram by May Sein Win.

School Personnel

"The visibility of school personnel, especially teachers rather than school resource (security) officers" provides the "largest deterrent to any civil or criminal behavior" within the school and on school premises.[31] Unlike circulation areas—hallways, stairs, etc.—it is almost a given that teachers will be present in the classroom when class is in session. Thus, hallways and stairs are areas where students are especially vulnerable. PGCPS High School Specifications also recognize this need for visibility of authority figures in hallways and stairs, because they encourage

[31] Lindle, Jane. 2008. "School Safety." *Educational Policy* 22 (1): 35

"[locating] administrative and teacher preparation with good visual contact of major circulation areas."[32]

According to Timm, there is "no way to measure [the] effectiveness" of the security measures used for deterrence.[33] One cannot know that a person is thinking of engaging in a criminal behavior. Thus, there is no reliable way for the school to know if a person has changed his or her mind about carrying out a plan because of the deterrence measures.

Detection

This method focuses on "the ability to discover undeterred activities and incidents as they occur." Many of the physical systems used for deterrence, such as surveillance cameras, security officers in lobbies or on-site, and visibility of teachers, can also play a role in detecting a criminal behavior as it occurs. Unlike deterrence methods, detection systems *can* be measured. One would simply have to keep track of the number of instances in which an individual or group is caught carrying out an unauthorized, harmful, and/or disruptive activity.[34]

Access Points

The design of school access points is crucial to detect intruders. Timm states that "too many schools operate with ineffective visitor management procedures and, at any given time, have no way to accounting for those that are in the facility or have

---

[32] Prince George's County Public Schools, "Prototype High School Educational Specifications*"* *Prince George's County Public Schools*, February, 2015,: 15 http://www1.pgcps.org/cip/index.aspx?id=207464. accessed October 5, 1015
[33] Timm, "School Security: How to Build and Strengthen a School Safety Program." 80
[34] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 80

left the facility."[35] This is perhaps because "it's a constant struggle to create access controls and have a school remain engaging," according to Scott Layne, an assistant superintendent of Irving Independent School District in Texas. Timm suggests three main strategies that a school can enforce to improve the access point: reducing or eliminating unmonitored entrances, installing electronic access control, and installing vestibules.[36]

Reducing or eliminating unmonitored entrances more or less requires the use of electronic access controls. As shown in **Figure 6**, many schools have more than a dozen access points, which include primary entry, fire stair exits, and through classrooms. Given a large number of entrances and the amount of students and school personnel, it is almost impossible for schools to manually keep track of the movement through their buildings—let alone detect intrusions as they happen. An electronic access control system (where everyone who belongs in school has an individually-registered access card) automatically records the date, time, and name of anyone who uses the swipe to access the building.

[35] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 82
[36] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 87-89

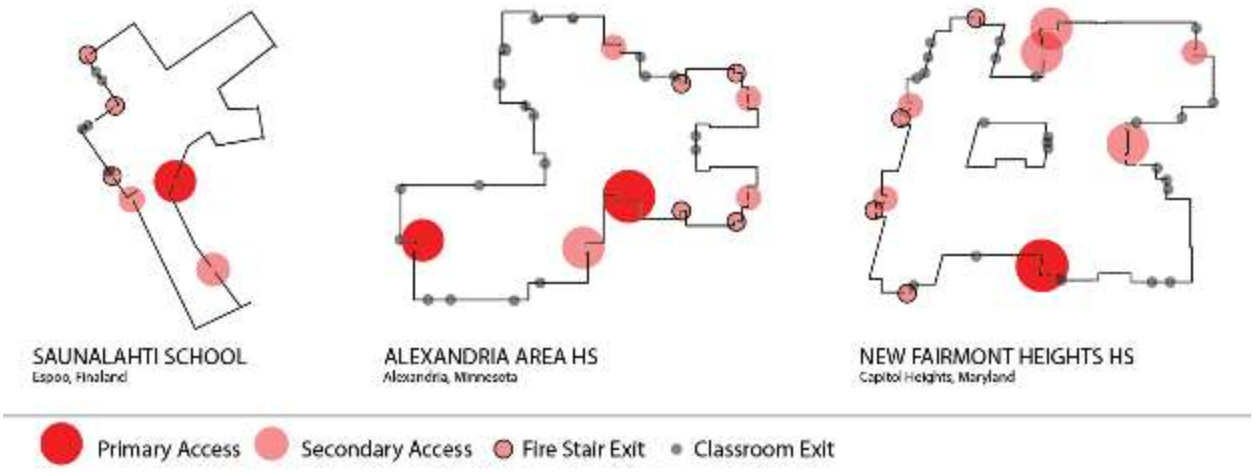


Figure 6: Diagram of primary and secondary access points in three precedent: Saunalahti School in Espoo, Finland; Alexandria Area High School in Alexandria, Minnesota; and Fairmont Heights High School in Capitol Heights, Maryland.
Diagram by May Sein Win.

Teachers, Staff, and Security Personnel

As is the case for deterrence, the presence of teachers and other school personnel increases the possibility of detecting instances of misconduct inside the school. Although the use of "school resource officers" (school personnel mainly responsible for security) is common, many researchers warn that "their presence offers increased risk of resistance and antisocial behaviors as well as erodes the personal relationships between teachers and students."[37] Training teachers to detect and resolve conflict among students within the school is recommended over "conceding power to school resource officers."[38] In addition, it is important to locate "teacher preparation [areas] with good visual contact of major circulation areas"[39] so that teachers are aware any problems that may occur even outside their classroom.

[37] Lindle, "School Safety." 36
[38] Lindle, "School Safety." 36
[39] Prince George's County Public Schools, "Prototype High School Educational Specifications*"* 15

Communications

Methods which belong in this category "enable physical security programs to function effectively"[40] such as: an alarm system that connects the school to a security system, or a public address (PA) system that connects the school administers to the faculty, staff, and students. Timm maintains that "the first hour of planning and the first dollar of spending should be spent on addressing two areas: communications and access control."[41]

It is crucial that in case of an emergency, such as a detection of an intruder or a violent fight among students, that teachers and students throughout the school can be notified appropriately and given crucial instructions. The following are some questions that an architect should ask to ensure that a school has an adequate communication system as it related to security:[42]

- Does your PA system reach all areas of the building with clarity and appropriate volume?
- Does your PA system have exterior capabilities?
- Intercom system: Are call buttons visible and accessible in all rooms?

[40] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 80
[41] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 81-82
[42] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 83

PGCPS Recommendations

PGCPS recommendations go a step further and maintain the need for teachers to communicate back to administrative offices.[43] It states that a "two-way voice communication system shall be installed that will provide communication between the administrative area and each teaching station or support area, with a telephone in every room."[44] Support areas include the media center, auditorium, gymnasium, cafeteria, and outdoor activity areas. PGCPS also predicts that in the future, "Video signals may be carried over IP from any internet able device."[45] Even in this instance, cables should still be preserved and maintained in the "gymnasium, auditorium, and main office for emergency broadcasts."[46]

Delay

Methods which belong to this category "[slow] the movements of an adversary" and include vestibules, special locks, fences, and vehicles barriers.[47] The aim is to "[delay] the attempted criminal break-in described above long enough for the communication system to summon a security response."[48]

Vestibules

Vestibules are a commonly-prescribed way to delay intruders. The PGCPS guideline recommends that students, teachers, staff, and visitors go through a

[43] Prince George's County Public Schools, "Prototype High School Educational Specifications*"* 14
[44] Prince George's County Public Schools, "Prototype High School Educational Specifications*"* 14
[45] Prince George's County Public Schools, "Prototype High School Educational Specifications*"* 14
[46] Prince George's County Public Schools, "Prototype High School Educational Specifications*"* 14
[47] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 80
[48] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 80

vestibule located at the primary entrance [Figure 7].[49] Vestibules reinforce the concept of "concentric circles of protection" (a tenet of Crime Prevention through Environmental Design (CPTED) theory) by increasing the numbers of barriers to access the school and thus slowing down potential intruders.[50] Many schools, such as the newly-built Oxon Hill High School in Prince George's County, also feature vestibules multiple times within the halls of the schools for the same purpose.

Figure 7: Administrative space requirements for the main access point for PGCPS. Plan by PGCPS.

Locking Systems

According to Kaiser, "locking systems are typically at the top of the security upgrade menu"[51] because locked doors delay the intruders by requiring them to physically break the locks and/or doors. Automatic locks for doors with exterior

[49] Prince George's County Public Schools, "Prototype High School Educational Specifications*"* 61
[50] Kaier, "Tackling Safety Through Design." 1
[51] Kaier, "Tackling Safety Through Design." 1

access are one such upgrade as they eliminate human error, such as if a teacher forgets to manually lock the door. Electronic swipes are another locking system upgrade employed in many schools across the United States.[52] It should be noted that even the most sophisticated locking system can be compromised by "door-propping."[53] Thus, it is important to "report, record, and remove" any instances of this.[54]

Response

Response methods include immediate response plans as well as recovery plans afterwards. An adequate emergency response system necessitates that the school has "assigned school resource officers, security personnel, administrators, faculty, and staff to recovery jobs."[55] Communication system is also integral to an effective response system as "every recovery plan would communicate with students and parents over the PA and mass notification systems."[56]

[52] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 89
[53] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 87
[54] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 87
[55] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 80
[56] Timm, *School Security: How to Build and Strengthen a School Safety Program.* 80

Site Selection: Prince George's County

University of Maryland's location in Prince George's County, and the county's adjacency to Washington, D.C. provides many potential sites which are suitable for to test out the effects of community and security on a school. Census data shows a growing [Figure 10] and extremely diverse population [Figure 12] that has the need for government support, especially in health-related services [Figure 15]. The high density of the county, especially in the western side, means that a large number of people could potentially benefit from the community aspect of the school design of the thesis [Figure 11]. The close proximity and the availability of the Metro system means that the school can benefit people who have access to the metro rail system who may live beyond the county and state lines.

Figure 8: Location of Prince George's County within Maryland.
Image by David Benbennick

Socio-economic Analysis of Prince George's County

Population Growth

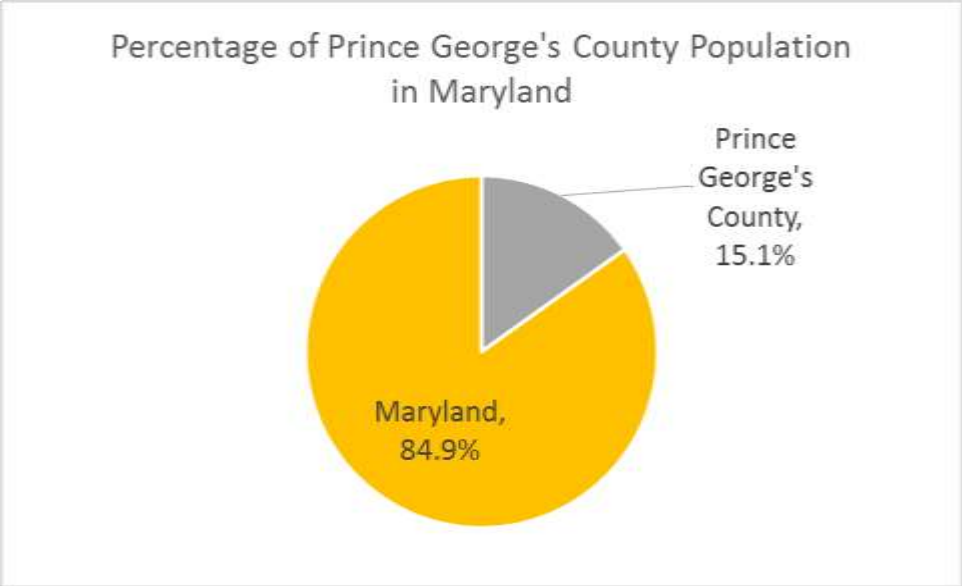


Figure 9: Population comparison of Prince George's County and Maryland for 2014, based on the estimates by the U.S. Census Bureau.
Chart generated by May Sein Win

According to the population estimate for 2014 by the U.S. Census Bureau, the population in Prince George's County is 904,430 people. It is the second most populous county in Maryland—following Montgomery County—and makes up about 15.1 percent of the population of the entire state (5,976,407 people). [57]

[57] "QuickFacts: Prince George's County, Maryland," United States Census Bureau, accessed November 29, 2015, http://www.census.gov/quickfacts/table/PST045214/24033,24

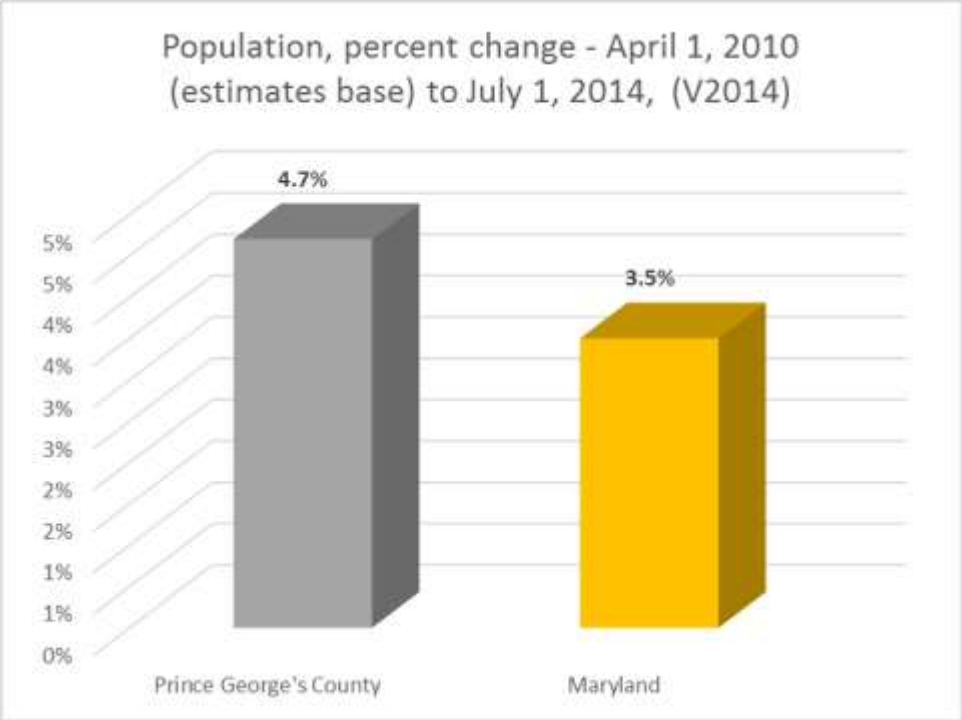


Figure 10: Population growth comparison of Prince George's County and Maryland from 2010 to 2014, based on the census data and estimates by the U.S. Census Bureau.
Chart generated by May Sein Win

Comparisons of data collected by the Census in 2010 to the population estimates for 2014 for both the Prince George's County and the state of Maryland allow for the calculation of rates of change of the population. Both the county and the state are experiencing a population increase: from 863,420 to 904,430, and 5,773,552 to 5,976,407 respectively. Prince George's County's population is growing at a faster rate (4.7%) than the state overall (3.5%).[58]

[58] United States Census Bureau "QuickFacts: Prince George's County, Maryland."

Population Density

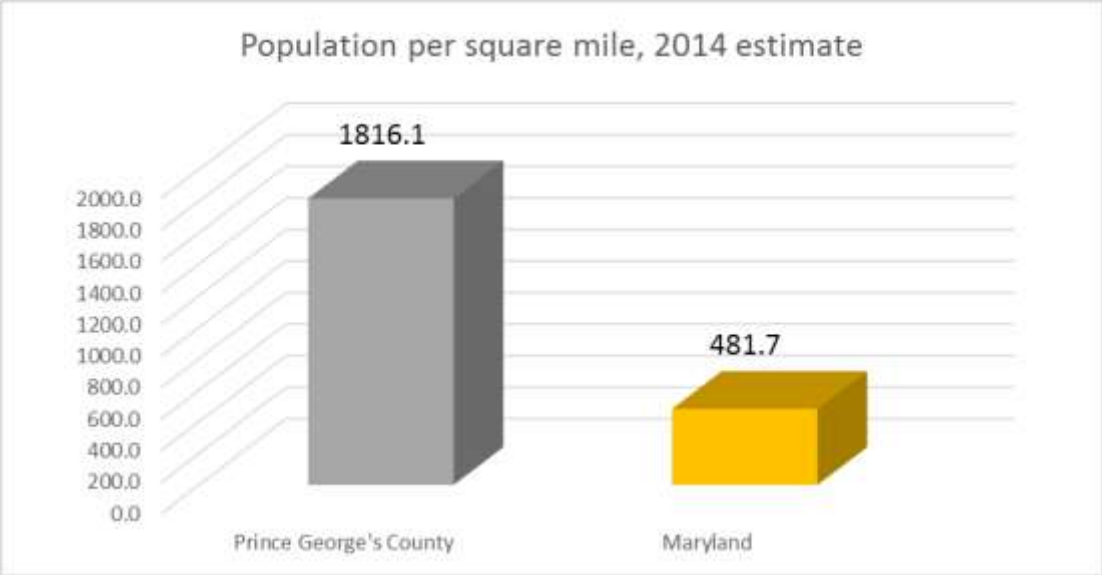


Figure 11: Population density comparison of Prince George's County and Maryland for 2014, based on the estimates by the U.S. Census Bureau.
Chart generated by May Sein Win

Prince George's County comprises 498 square miles and the county's population density is 1,816 people per square mile.[59] It is the second most populous county in Maryland, after Montgomery County. The county is significantly more densely populated than the state, which has the population density of 482 people per square mile.[60] In comparison, Montgomery County, which is also located adjacent to Washington, D.C., has a slightly lower population density of 1,762 people per square mile.[61]

[59] "State & County QuickFacts: Maryland County Selection Map" United States Census Bureau, accessed November 29, 2015, http://quickfacts.census.gov/qfd/maps/maryland_map.html
[60] United States Census Bureau "QuickFacts: Prince George's County, Maryland."
[61] "QuickFacts: Maryland," United States Census Bureau, accessed November 29, 2015, http://www.census.gov/quickfacts/table/PST045214/24,24031

Diversity

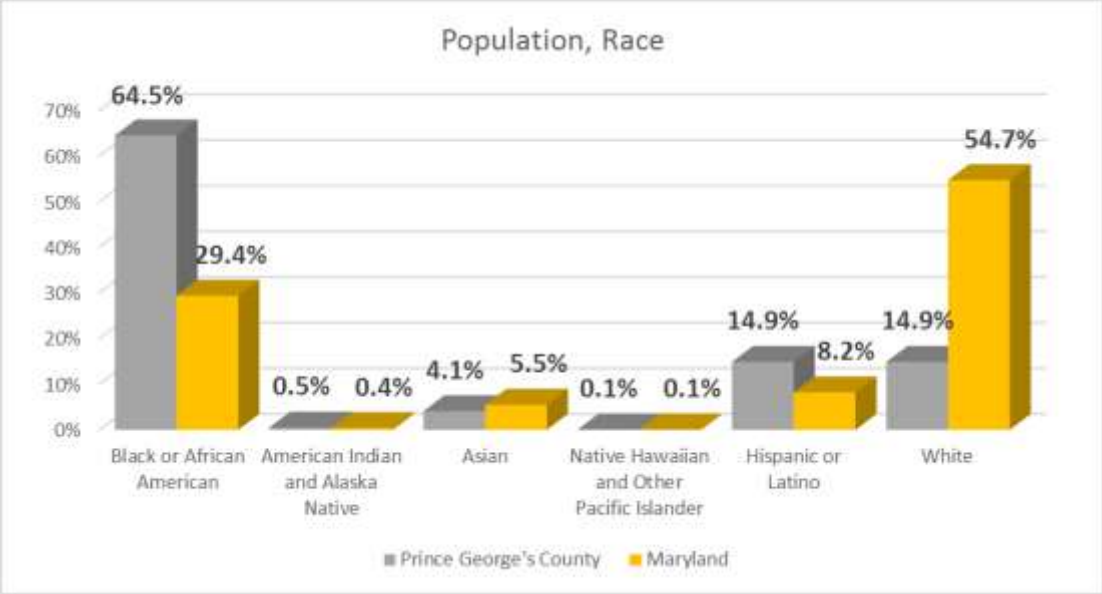


Figure 12: Percentage of population by race—comparison of Prince George's County and Maryland for 2010, based on the census data by the U.S. Census Bureau. Chart generated by May Sein Win

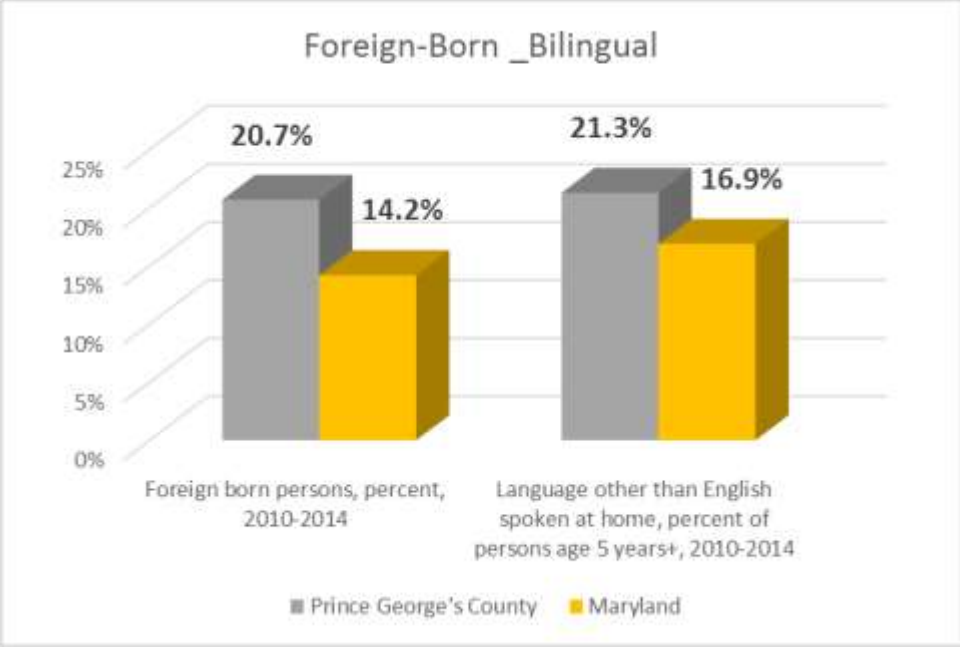


Figure 13: Percentage of foreign-born and bilingual population—comparison of Prince George's County and Maryland for 2010-2014, based on the census data by the U.S. Census Bureau. Chart generated by May Sein Win

Prince George's County is significantly more racially diverse than Maryland overall; indeed, there is a more even distribution of residents belonging to different racial groups. The Black or African American population is the majority (64.5% of the overall population) in the county while White population is the majority in the state (54.7%). The Hispanic or Latino population makes up a significant portion of the population of the county (14.9%), which is equal to the percentage of the White population in the county (14.9%). The county has a comparable percentage of Asian population (4.1%) to the state (5.5%).[62]

Education Attainment and Income

The county has slightly lower level of educational attainment than the state. The percentage people in Prince George's County with a high school degree (85.6%) and bachelor's degree or higher (30.4%) is less than the state (89%, 37.3%). Despite the slight difference in the educational attainment level, the median household income for the county ($73,856) is around the same level as that of Maryland ($74,149).[63]

Cost of Shelter

The cost of housing in Prince George's county is lower than the state's. The median value of owner-occupied housing units is 258,800 dollars in the county; the cost of the same type of unit is around 28,700 dollars more in the state ($287,500).

[62] United States Census Bureau "QuickFacts: Prince George's County, Maryland."

[63] United States Census Bureau "QuickFacts: Prince George's County, Maryland."

The cost of rent is slightly higher in the county than the state. The median gross rent per month in the county ($1,276) is slightly more than the state ($1,218).[64]

Social Assistance

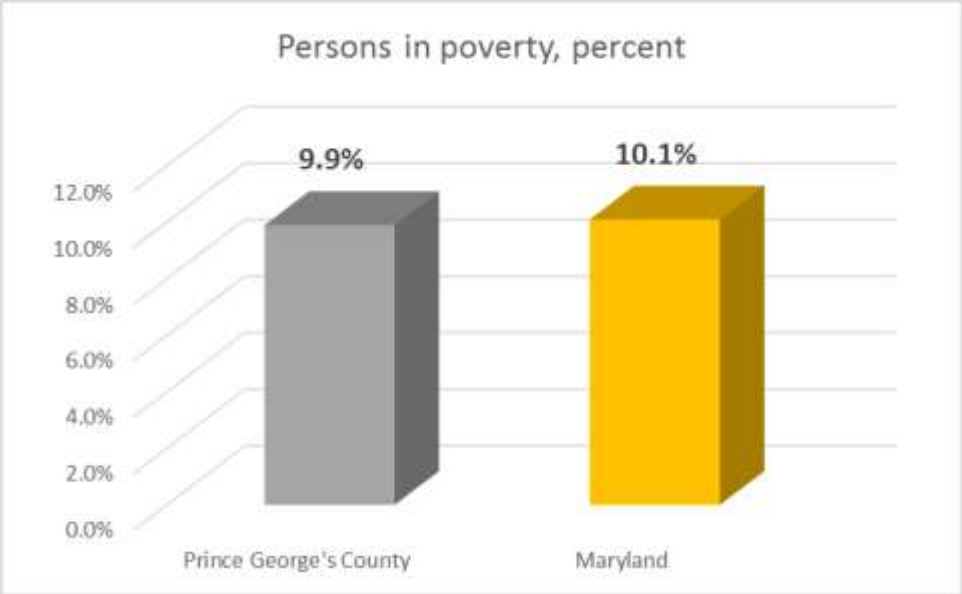


Figure 14: Poverty level comparison of Prince George's County and Maryland for 2014, based on the estimate by the U.S. Census Bureau.
Chart generated by May Sein Win

[64] United States Census Bureau "QuickFacts: Prince George's County, Maryland."

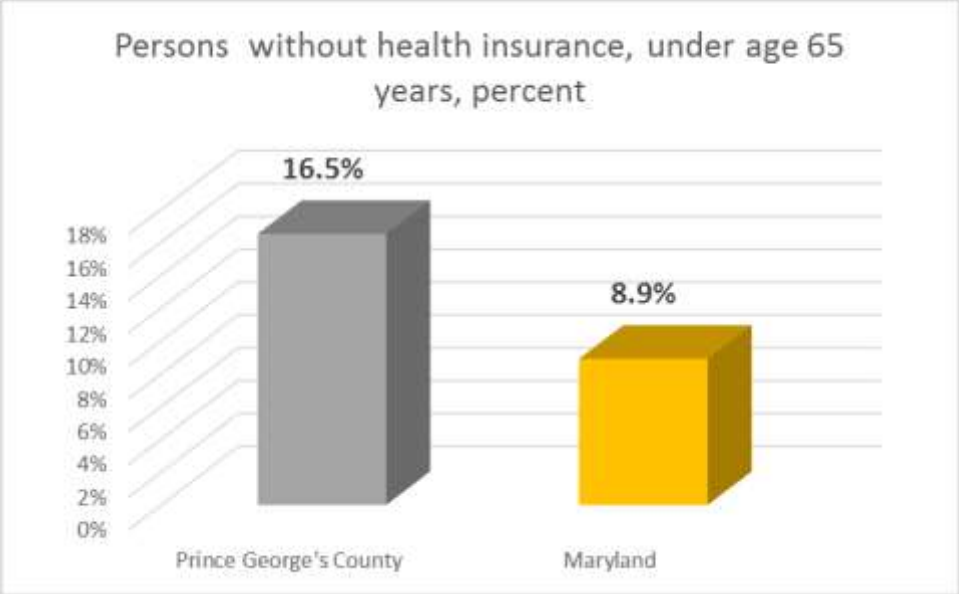


Figure 15: Population with health insurance comparison of Prince George's County and Maryland for 2014, based on the estimate by the U.S. Census Bureau.
Chart generated by May Sein Win

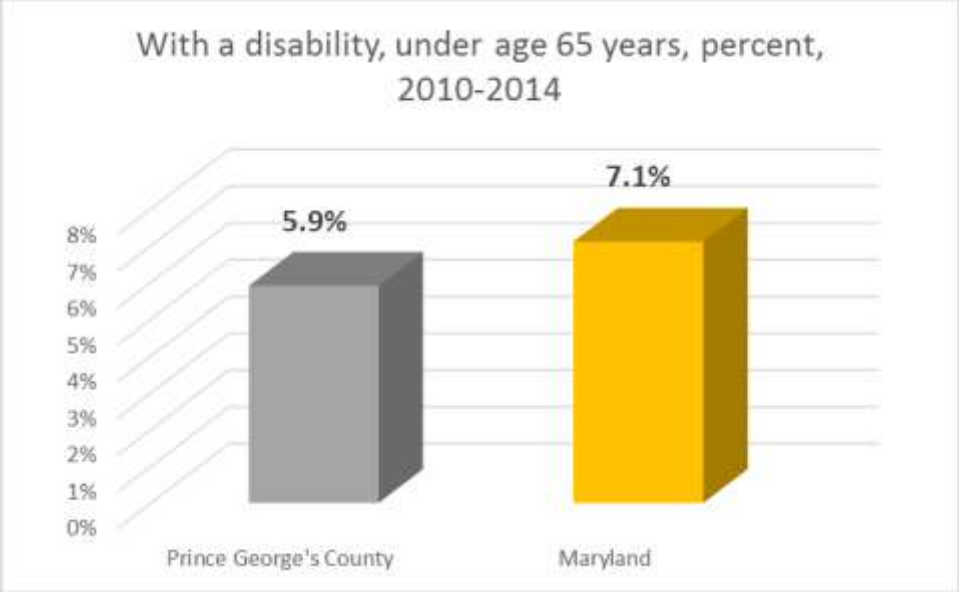


Figure 16: Population with disability comparison of Prince George's County and Maryland for 2014, based on the estimate by the U.S. Census Bureau.
Chart generated by May Sein Win

The level of poverty in the county and the state is also comparable. Around 9.9% of people in the county is in poverty and Maryland has the poverty percentage

of 10.1%. Alarmingly, a substantial portion of the residents of the county do not have health insurance (16.5%). Despite similar levels of income and poverty rates between the county and the state, Prince George's County has almost the double the percentage of people (under 65 years old) without health insurance.[65]

Climate

The high level of temperature fluctuation makes heating, and cooling systems essential to the school, which means that energy consumption, cost, and sustainability should be taken into account [Figure 17]. This can potentially come in conflict with providing natural light into the school, which calls for larger windows—and more heat loss. Strategic window placement, shading devices, and high-grade insulating windows and walls can remediate the need for day light and temperature control.

The structure of the school should be able to support substantial amount of snow load. In 2015, Baltimore weather station measure 14.6 inches of snow in February. Precipitation is also present year-long. Precipitation and temperature fluctuation means that the materials and structural systems used in the school should allow for proper expansion and contraction.

[65] United States Census Bureau "QuickFacts: Prince George's County, Maryland."

Temperature

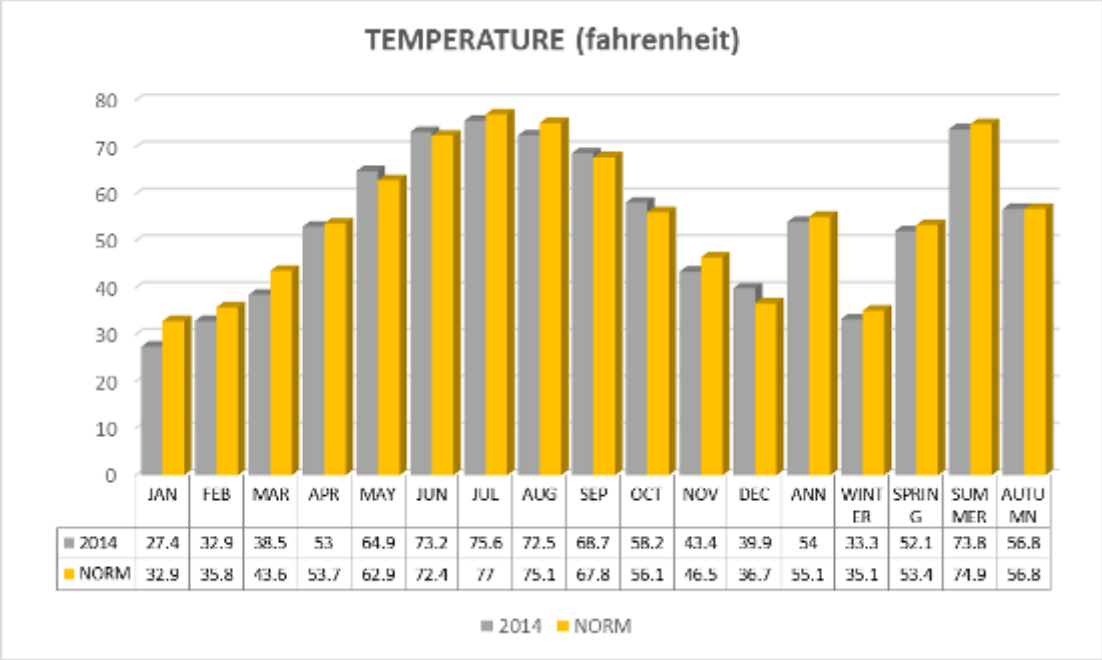


Figure 17: Temperature summary and comparison for Baltimore Station—nearest station to Fairmont Heights High School. Data from National Oceanic & Atmospheric Administration Chart by May Sein Win

Site Selection: Schools

The thesis aims to find a balance the three seemingly contrasting theories: School-centric vs. Community Involvement; treating the causes of violence vs. Preventing Immediate harm; and "Flexible" Plan vs. Program-specific Plan. Thus, the ideal site would have the basic necessities, such as infrastructure, to be connected to the community, where the thesis design have the opportunity to help it realize its full potential. The potential site should also have relatively high crime rate, as one set of theories which the high school design would find a solution for is related to violence and crime.

Jane Jacobs and the Theories of a Safe Street

Jane Jacobs, a prominent author and activist whose work had a profound influence on urban planning, wrote extensively on the characteristics of a vibrant community. Her seminal book *The Death and Life of Great American Cities* takes the position that sidewalks and streets are the features that most define how safe a city is.[66] In the book, she proposes the three qualities of a successful city street:

1. A clear "demarcation" between the public and private spaces
2. "Eyes upon the street": buildings oriented to the street
3. Sidewalks with "fairly continuous" pedestrian use[67]

[66] Jacobs, Jane. 1961. *The Death and Life of Great American Cities.* New York: Random House.: 29-30
[67] Jacobs, *The Death and Life of Great American Cities*. 35

Admittedly, Jacobs points out that city streets are markedly different from streets of "little towns or true suburbs",[68] because city streets are full strangers. Although majority of neighborhoods in Prince George's county could be categorized as towns or true suburbs, the potential sites of this thesis to be analyzed could not be categorized as such. All four sites share the characteristics of a city streets in that they are all Metro-accessible, which means that presence of "strangers" is expected, if not inevitable.

Clear Demarcation of the Public and Private

The first characteristic of a good city street is that "there must be a clear demarcation between what is public space and what is private space."[69] A clear "demarcation" helps to inform pedestrians of public places, such as a park or a library, where they are welcome. This means that it also serves to deter people from intentionally or accidentally entering a private area, and thus reduces conflict.

"Eyes Upon the Street"

The second quality is best known as "eyes upon the street" where the building fronts are oriented towards the street. Ideally, building fronts would make up an almost- continuous "façade" along the street to create a contained space. Practically, the orientation of the building toward the street serves to make a safer street because residents are more likely to spot crimes and report such incidents. Conceptually, a street onto which buildings face communicates to visitors that it is a street of

[68] Jacobs, *The Death and Life of Great American Cities*. 30
[69] Jacobs, *The Death and Life of Great American Cities*. 35

importance and that the residents have not "turn[ed] their backs or blank sides on it and [left] it blind."[70]

Continuous Use of Street

The third quality is that "the sidewalk must have users on it fairly continuously."[71] Jacob states that the main objective of active pedestrian flow is to encourage adjacent residents to watch the sidewalk; she reasons that "Nobody enjoys sitting on a stoop or looking out a window at an empty street."[72] Although it is not explicitly stated by Jacobs, one can deduce that no one enjoys walking in an empty sidewalk either. Thus, a continuously-used sidewalk can encourage more people to walk and put even more "eyes on the street". For a school, this means that realm of the design has to move beyond the immediate boundary of the school to make the streets more pedestrian-friendly. Furthermore, a school should serve as a destination that the community can continuously use throughout the day to ensure a steady flow of visitors.

Analysis of Crime in Prince George's County

Methods Used to Obtain Data on Crime

This thesis started out as an investigation into how schools deal with increasing mass-shooting incidents in the country and the effects that that has on the design of schools. One of the main characteristics explored during the initial phase of the site selection process was the distribution of crime related to shooting in Prince

[70] Jacobs, *The Death and Life of Great American Cities*. 35
[71] Jacobs, *The Death and Life of Great American Cities*. 35
[72] Jacobs, *The Death and Life of Great American Cities*. 35

George's County. The use of Geographic Information System (GIS) revealed any spatial patterns which may enlighten how crime relates to the county.

Official governmental website of the Prince George's County provided the data of the reported "assault, shooting" incidents which occurred from 2011 to 2015.[73] The data contained the location of each incident given by both street address and coordinates. ArcMap allowed the quick placement of the locations of the incidents on the map of the Prince George's County through the geocode function. GIS database of the Prince George's County made available to the public the districts—or catchment areas of students—of the County's public high schools, as well as the location of each [Figure 18]. As connectivity is also one of the main criteria for site selection, mapping the one-mile radius around Metro stations shows which schools are Metro-accessible [Figure 19]. Only four public high schools in the county are located within a mile of a Metro station: Northwestern High School, Fairmont High School, Central High School, and Suitland High School.

[73] "Data Prince George's," Prince George's County, last modified November 20, 2015, accessed November 21, 2015, https://data.princegeorgescountymd.gov/browse?category=Public+Safety

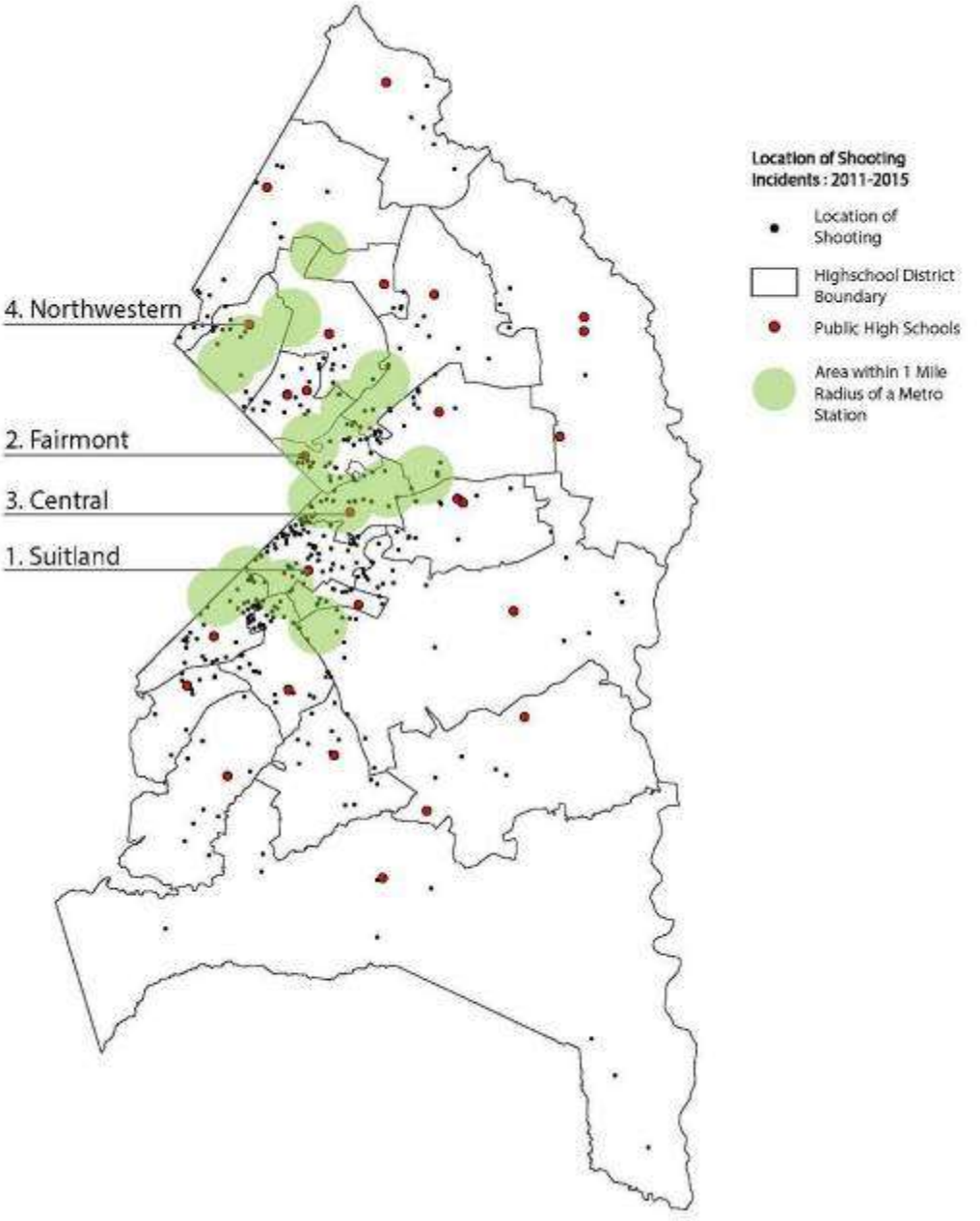


Figure 18: Location of reported shooting accidents in Prince George's County from 2011 to 2015. Map generated by May Sein Win using ArcMap GIS

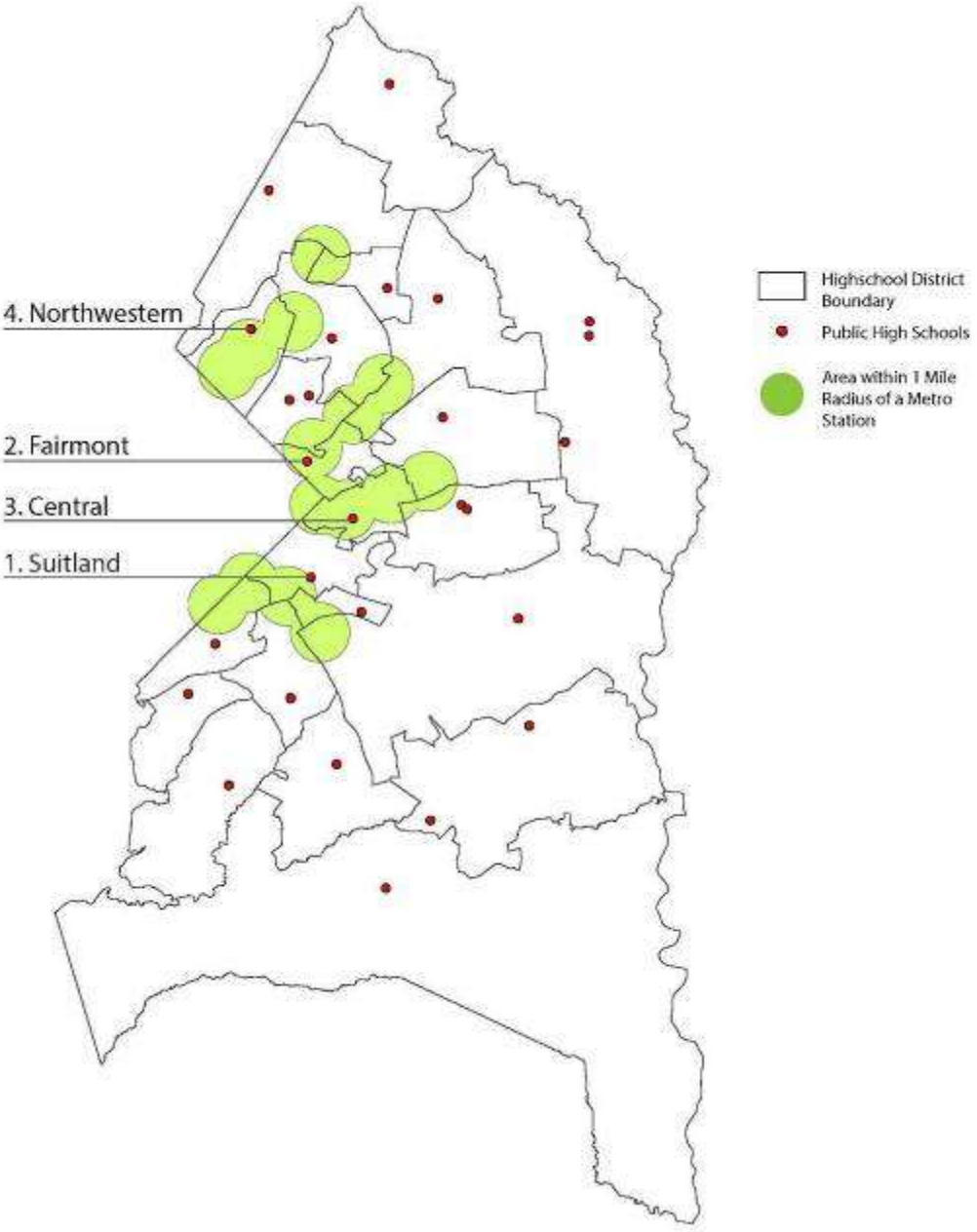


Figure 19: Prince George's county public high schools and their districts as they relate to Metro stations.
Map generated by May Sein Win using ArcMap GIS

Analysis of Crime Data

One can see by looking at the map of shooting incidents [Figure 18] that there seems to be a greater concentration in the central western border of the county where

it meets Washington, D.C. In addition, the high schools which are closer to Washington have smaller district boundaries. This reason for this is likely that population density is greater in this area [Figure 20].[74]

Spot density analysis in ArcMap generated a visual representation of the stated crime density, which allows for a clearer understanding of the where and how the reported shooting incidents are concentrated [Figure 21]. This map confirmed what the initial map [Figure 18] of locations of crime shows—that overall, there is a higher concentration of crime along the D.C. border. Interestingly, the "pockets" where the highest density of crime occurred (shown in the dark brown) are all located in areas outside the one-mile radius of Metro stations. This seems to suggest that the proximity of a Metro station may have a role in the decrease in the reported shooting incidents in the area. This may be due to a greater connectivity, greater street activity, Metro police presence, and/or more transit-oriented development (TOD).

[74] "Population Density," PGAtlas, last modified January 6, 2016, accessed January 7, 2016, http://www.pgatlas.com/

Figure 20: Population density of the tracts of Prince George's County, based on 2010 census. Image by PGAtlas.[75]

[75] "Population Density," PGAtlas, last modified January 6, 2016, accessed January 7, 2016, http://www.pgatlas.com/

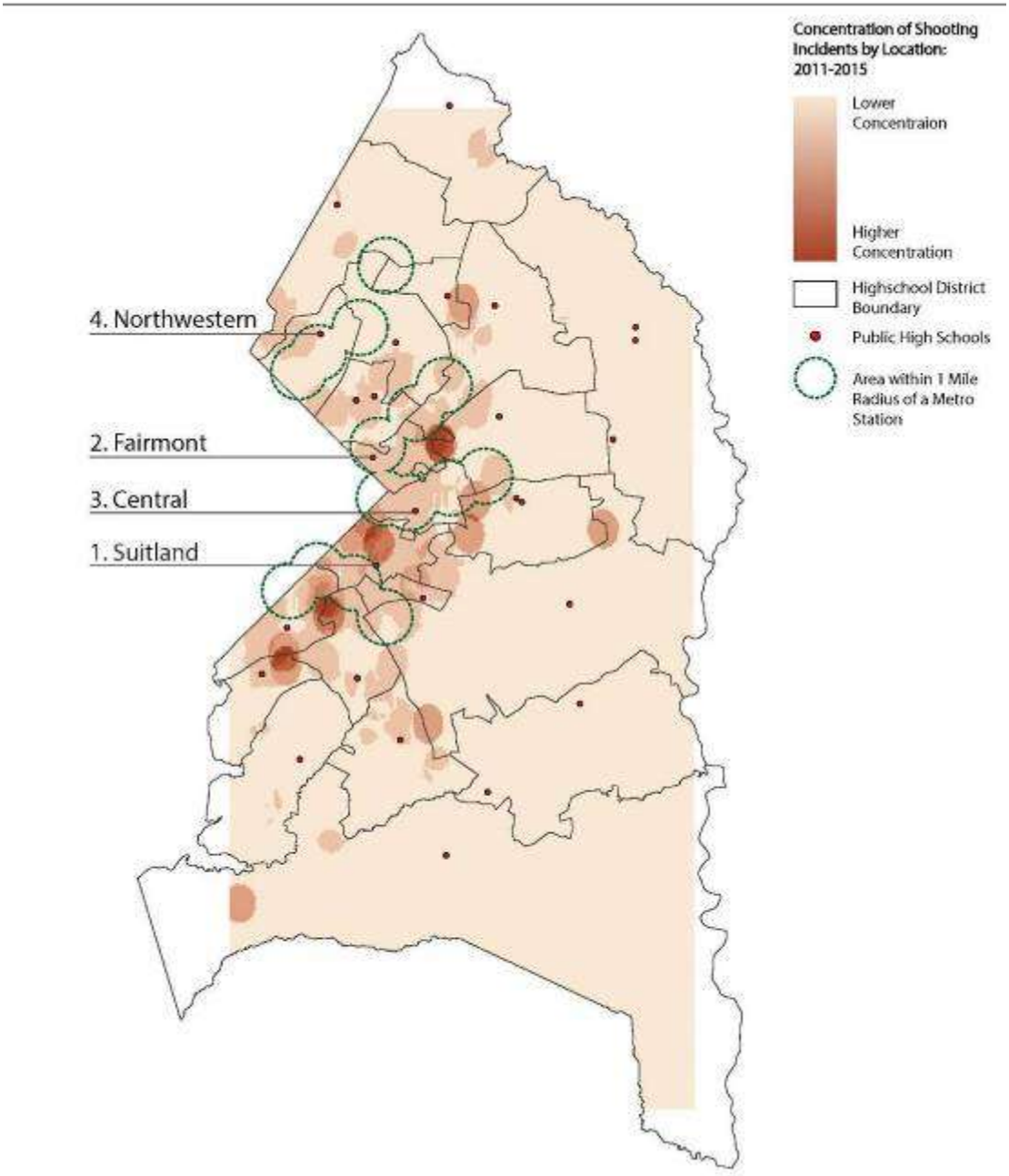


Figure 21: Concentration of the location of reported shooting incidents in the Prince George's County from 2011 to 2015.
Map generated by May Sein Win using ArcMap GIS

Relationship between Crime Data and School Districts

The next goal is to spatially analyze crime incidents as they relate to school districts. For this, the join function in ArcMap connects the data of the school districts with the crime data. This function allows the analysis of one set of data, such as crime-counts, as it relates to another set, such as the area of a school district. The first map compares total number of reported shooting incidents within each school's district [Figure 22]. The most striking observation which emerged from this map is that the District of Suitland High School, which is one of the smallest high school districts in the county, has the highest total count of shooting incidents at 87 incidents.[76] Another interesting pattern evident in the map is that the highest total count per district seems to spread along the central "belt" of the county.

Map of the density of reported shooting incidents in relations to the overall area of the districts was also integral in analyzing how crime related to each district [Figure 23]. The map reveals that the highest concentration of crime occurred along in the district which are located along the border of Washington, D.C., towards the southern side. Looking at the overall pattern, this map shows that the least concentrated crime districts are located furthest from D.C.; this supports what the spot density analysis [Figure 21] has suggested. It should be noted that districts of the four public high schools which are located within the one-mile radius of Metro stations have varying degrees of density of crime.

[76] "Data Prince George's," Prince George's County

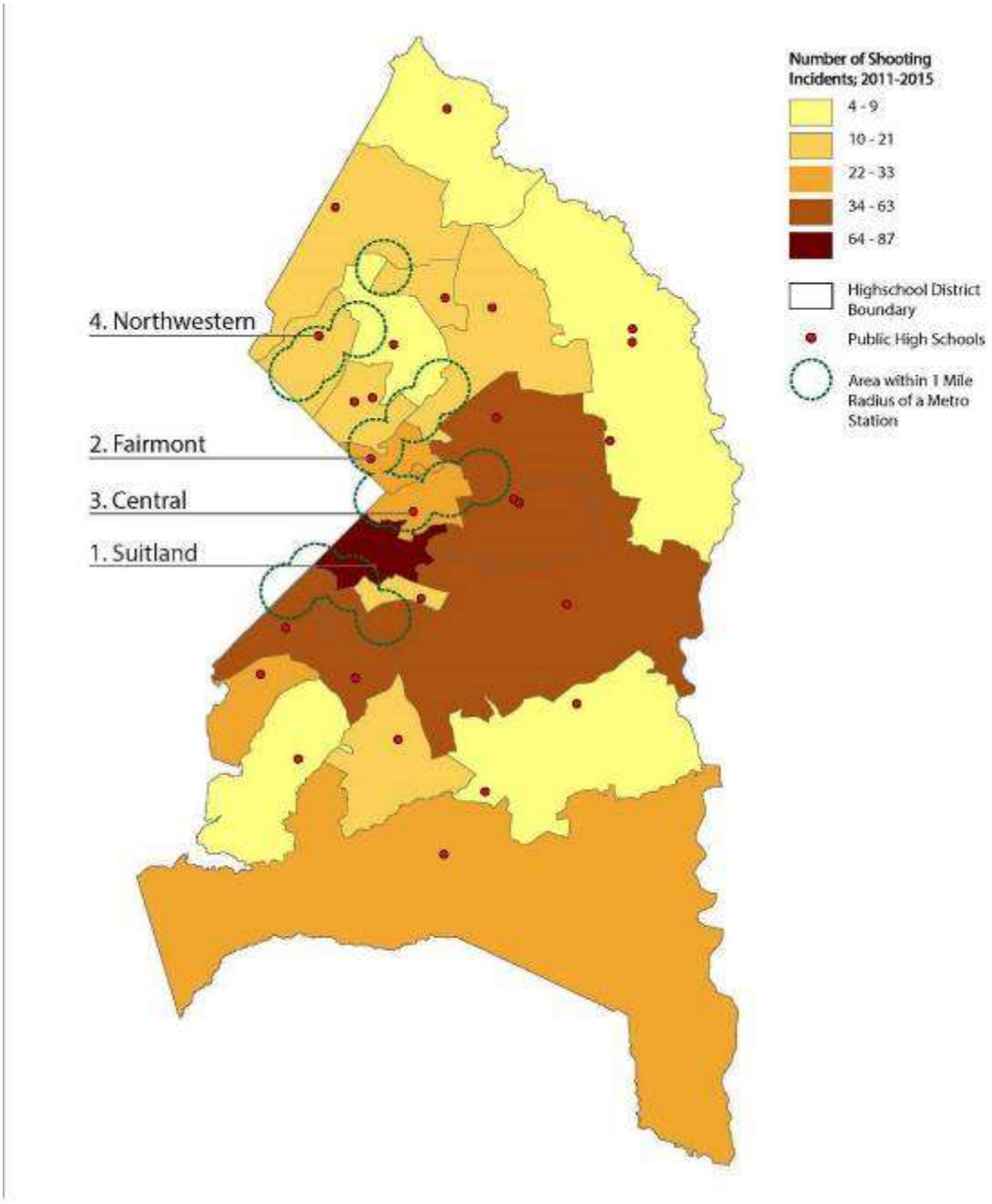


Figure 22: High school districts and the comparison of the number of total reported shooting incidents which occured within each district.
Map generated by May Sein Win using ArcMap GIS

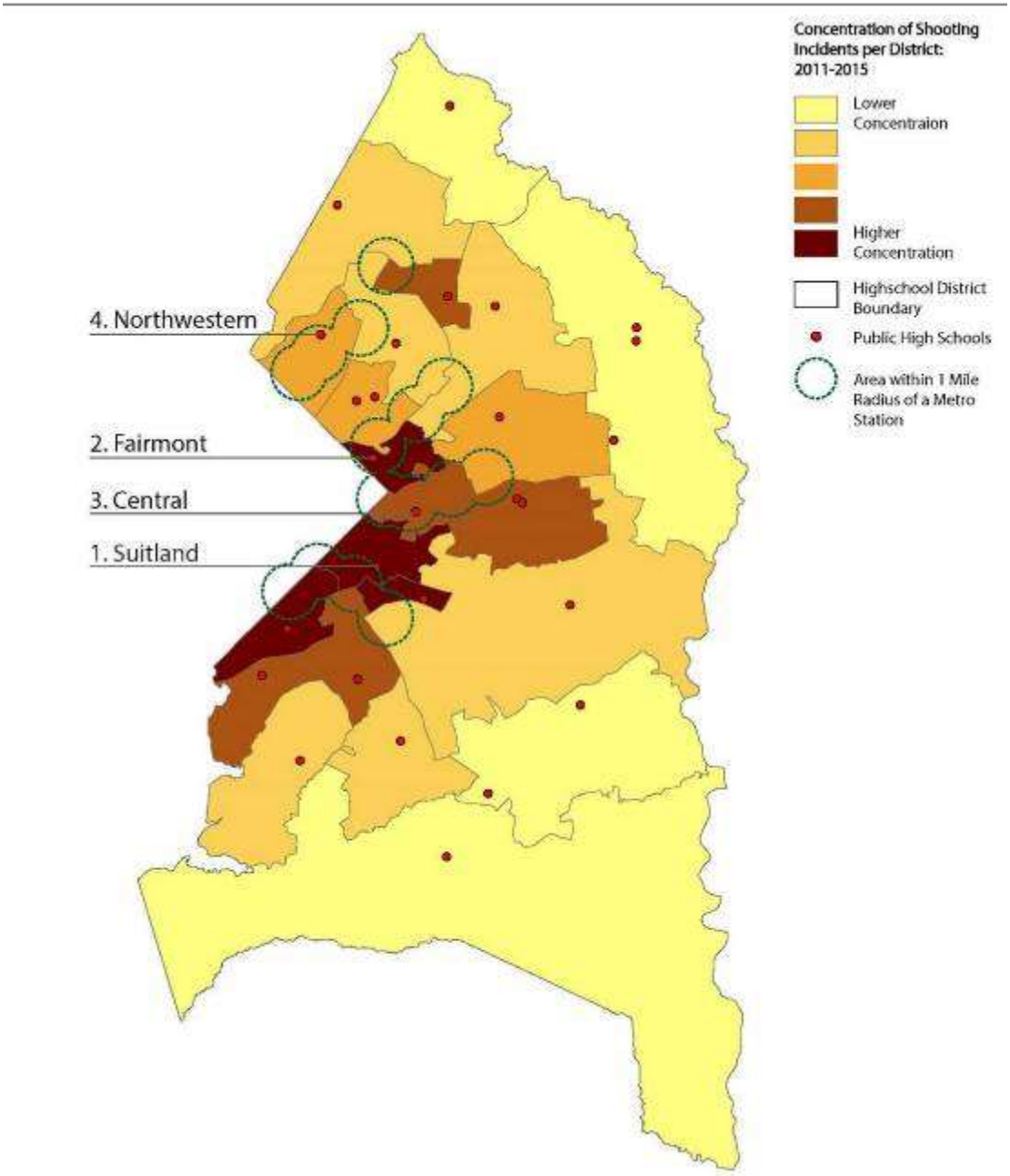


Figure 23: High school districts and the comparison of the density of the reported shooting incidents within each district in relations to the area of each district.
Map generated by May Sein Win using ArcMap GIS

Prevalence of Crime	Suitland	Fairmont	Central	Northwestern		Key
Proximity of the Incidents to the School						Highest
Number of Shooting Incidents Reported Between 2011-2015						
Density of Incidents in Relations to Area of the School District						Lowest

Figure 24: Comparison of crime statistics with the four Prince George's public high schools located within one mile distance of a Metro station.
Chart by May Sein Win.

The chart above [Figure 24] shows the comparative prevalence of crime of each high school based on three criteria stated. The comparison is only based on the reports of shooting incidents reported from 2011 to 2015 and does not include any other form of crime. Based on this data, Suitland has the highest level of crime overall. This chart gives an idea of how relevant and necessary security measures are to each school.

Site Selection: Connection at a Regional Scale

Connectivity to regional hubs is one of the integral features of a good site. As such, the four public high schools in the Prince George's County located within a mile of a Metro station present themselves as potential sites: Suitland High School, Fairmont High School, Central High School, and Northwestern High School. *Grid/street/place: Essential Elements of Sustainable Urban Districts*[77], which has become the manual for diagramming the standard of a district or a neighborhood, provided a guide to analyzing the four sites.

[77] Cherry, Nathan., and Kurt. Nagle. 2009. *Grid/street/place : Essential Elements of Sustainable Urban Districts.* Chicago: Americaanning Associatioanners Press.

Grid/street/place compared the circulation and connectivity of places by diagramming the primary and secondary right-of-way and the intersections as well as the railroad right-of-way.[78] Circulation diagram on a district level shows the highways and major avenues as the primary paths and multi-lane roads as the secondary paths. It should be noted that while highways and major avenues serve as connections on a regional scale, they can also act as dividers and barriers for the immediate surrounding neighborhoods. A site surround by highways would actually be disconnected from its immediate surroundings. Thus, it is more preferable if the site is connected to primary paths by the way of secondary paths.

Connectivity would mean little for the school if there is no destination to travel to. Thus, a diagram of civic institutions was integral to show the places that the students, teachers, and the community could use. In addition, consideration was made for how the sites relate to other educational institutions nearby.

[78] Cherry and Kurt, *Grid/street/place*, 44

Suitland High School

Figure 25: Connectivity on a regional scale for Suitland High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

Figure 26: Vehicular paths to regional public destinations around Suitland High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

Suitland High School is located about one and a half miles south-east of the Washington, D.C. border. The school is well-connected to D.C. and regionally by the presense of several primary paths: Pennsylvania Avenue, Silver Hill Road, and the Suitland Parkway highway [Figure 25]. Metro's Green Line provides another mode of transportation to D.C. and other parts of the county. As mentioned before, primary paths can often act as barriers to the areas which immediately surrounds; such is the case for Suitland High School because site is bordered by Pennsylvania Avenue towards the north-east and Silver Hill Road towars south. Pennsylvania Avenue is

four lanes and Silver Hill Road is six lanes, which makes it hard for pedetrians to cross and access the school. Compared to the three other sites, the overall level of connetion is poor because of the paucity of secondary paths. Secondary paths connect primary paths together, give the driver more options toward a destination, and thus tend to lessen cogestion on a specific road.

There is a scarcity of civic buildings near Suitland High School on a regional scale; there are none within a mile radius of the school. The nearest civic institution—Francis A Gregory Libray—is located approximately two mile west of the school in Washington, D.C. There are several educational institutions—five elementary schools and one middle school—surrounding Suitland High School. The nearest Metro stop, Suitland Station, is located about one mile from the school and is accessible by car from Silver Hill Road [Figure 26].

Fairmont Heights High School

Figure 27: Connectivity on a regional scale for Fairmont Heights High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

Figure 28: Vehicular paths to regional public destinations around Fairmont Heights High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

Fairmont Heights High School is located close to Washington, D.C. It is well-served by secondary paths within its immediate surrounding. From the site, one would have to take the secondary road to be connected to a primary road. The school site is not cut off by primary roads and thus is more connected to the immediate neighborhood than other sites [Figure 27]. There is a public library—Deanwood Neighborhood Library—approximately 0.70 miles away from the school. In addition, it is in a walkable distance of a Metro station—Cheverly Station. Several educational institutions are located nearby, beyond the D.C. border [Figure 28].

Central High School

Figure 29: Connectivity on a regional scale for Central High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

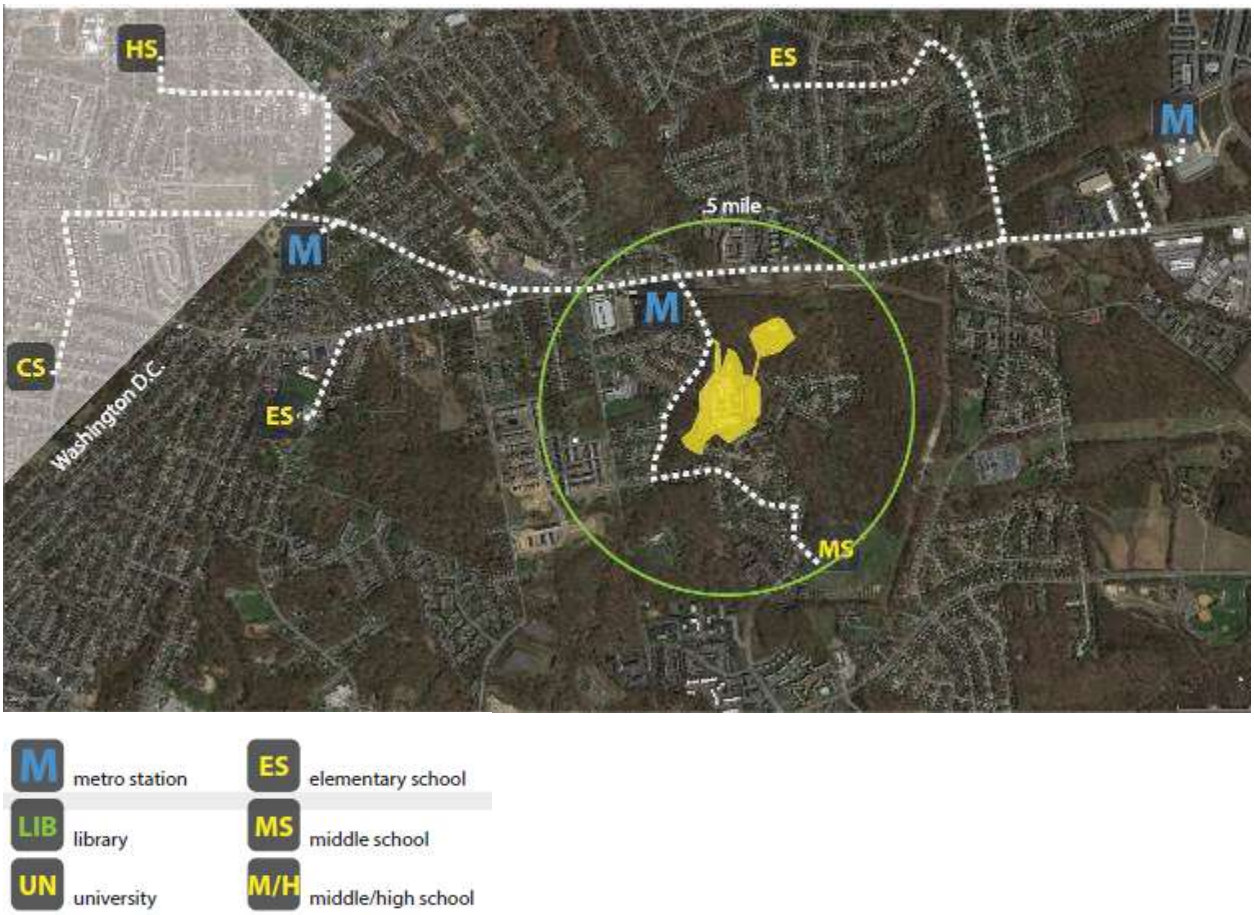


Figure 30: Vehicular paths to regional public destinations around Central High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

Central High School is not well-connected regionally. The site is not immediately served by secondary or primary roads. The overall road network is sparse. There is only one primary road—Central Avenue—which connects the site to D.C. and the rest of the county [Figure 29]. There is a Metro station—Addison Road Station—within a walking distance. There are no civic institutions in close proximity. Of note, however, is that the Metro line runs underground below Central Avenue [Figure 30].

Northwestern High School

Figure 31: Connectivity on a regional scale for Northwestern High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

Figure 32: Vehicular paths to regional public destinations around Northwestern High School.
Diagram by May Sein Win
Aerial image from Google Earth Pro

Northwestern High School is extremely well connected regionally, as there are plethora of interconnected primary and secondary paths. However, the site is not immediately served by any secondary paths, which means that drivers would have to take multi-lane primary road—Adelphi Road—or circuitous neighborhood streets [Figure 31]. There is a Metro station in a walking distance from the site, and the University of Maryland is within a five-mile radius. Although the university is not a civic institution, it does offer many amenities, such as the use of its facilities (with a fee) [Figure 32].

Connectivity	Suitland	Fairmont	Central	Northwestern		Key
Proximity to a Metro Station						Highest
Interconnected Primary and Secondary Roads						
Number of Nearby Civic Institutions						
Number of Nearby Educational Institutions						Lowest

Figure 33: Connectivity comparison on four schools chosen for site analysis.
Chart by May Sein Win

Based on the criteria established for the level of connectivity on a regional scale shown in the chart above, Fairmont Heights High School scored the best out of the four site analyzed for school selection. Also taken into consideration, as subset of the main criteria, are the type of paths which border the school and accessibility of the nearby civic institutions. Although Northwestern has greater number of primary and secondary paths in the region than Fairmont Heights, only on primary road directly serves the road.

Site Selection: Boundary Condition and Connection on a Neighborhood Scale

Jane Jacobs states that in order for the streets to be safe, "there must be a clear demarcation between what is public space and what is private space" and that they

"cannot ooze into each other".[79] Although Jacobs is referring specifically to city streets, the concept is very much applicable to schools. A clear distinction of the school property helps to prevent unintentional trespassing as the person would be very aware that they are no longer in a completely public space. As Steve Turckes, a principle at Perkins+Will, stated, "We need to think more about the perimeter of a site or a building."[80]

Given the factors stated above, diagrams of the edge condition of the school properties reveal whether a clear demarcation exists. Furthermore, emphasis was put on edge condition that would make "eyes on the street" possible. In other words, an ideal site would have homes or buildings fronts facing the school properties on all sides.

Jane Lindle states, "answer to issues of school security and safety lies in the development of community."[81] Many scholars support the notion that schools and surrounding neighborhoods are inevitably linked[82] Thus, one of the objective is to explore how each of the four schools are linked to their immediate neighborhood. Destination diagram shows the locations within a walkable distance of the school (half a mile), their characteristics (commercial or civic), and the edge conditions of the paths leading to those destinations.

As true for the regional scale, connectivity and destinations are also important on a neighborhood scale. On this scale, the walking experience is more relevant than

[79] Jacobs, *The Death and Life of Great American Cities*. 35
[80] Kaier, "Tackling Safety Through Design." 1
[81] Lindle, "School Safety." 39
[82] Nance, Jason P. 2013. "STUDENTS, SECURITY, AND RACE." Emory Law Journal 63, no. 1: 1-57. Academic Search Complete, EBSCOhost (accessed December 2, 2015).

the driving experience. Jacobs' second quality of a safe street—"eyes upon the street"—states that the building fronts are oriented towards street tend to make it safe.[83] Thus, the diagram of edge condition of the paths to destinations becomes important to see if they are contained streets—where building fronts would make up almost a continuous "façade" along the street.

Precedent Studies

Dunbar High School

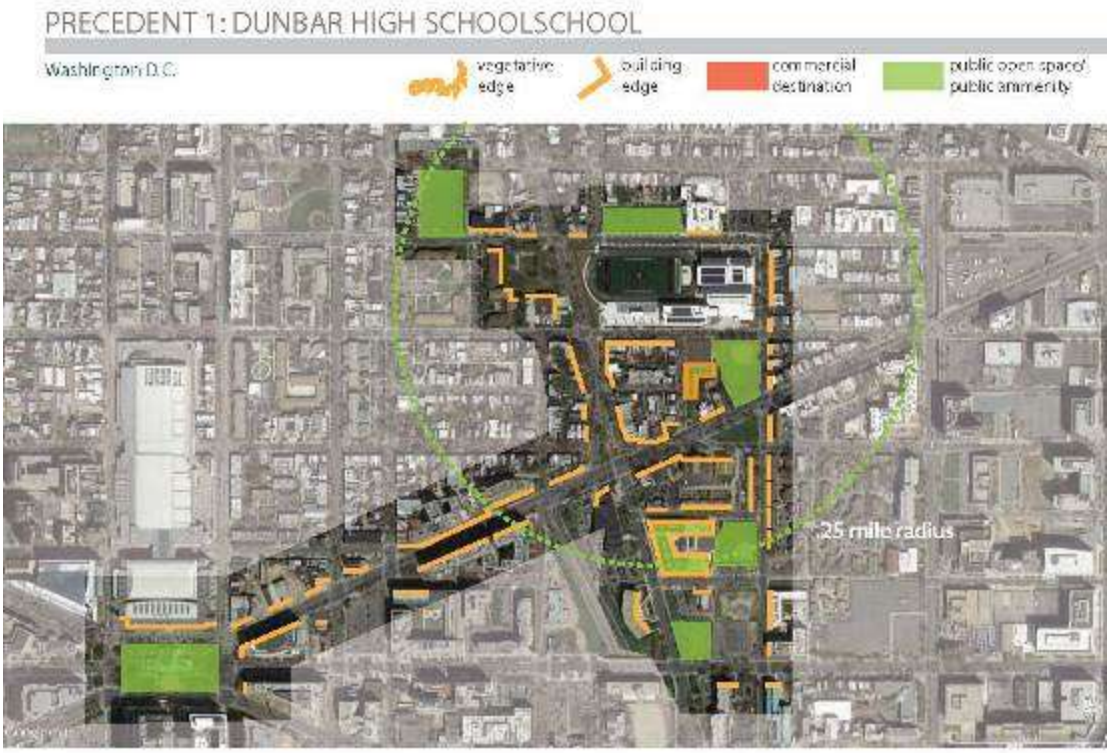


Figure 34: Diagram of nearby destinations and the edge condition of the paths from Dunbar High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

[83] Jacobs, *The Death and Life of Great American Cities*. 35

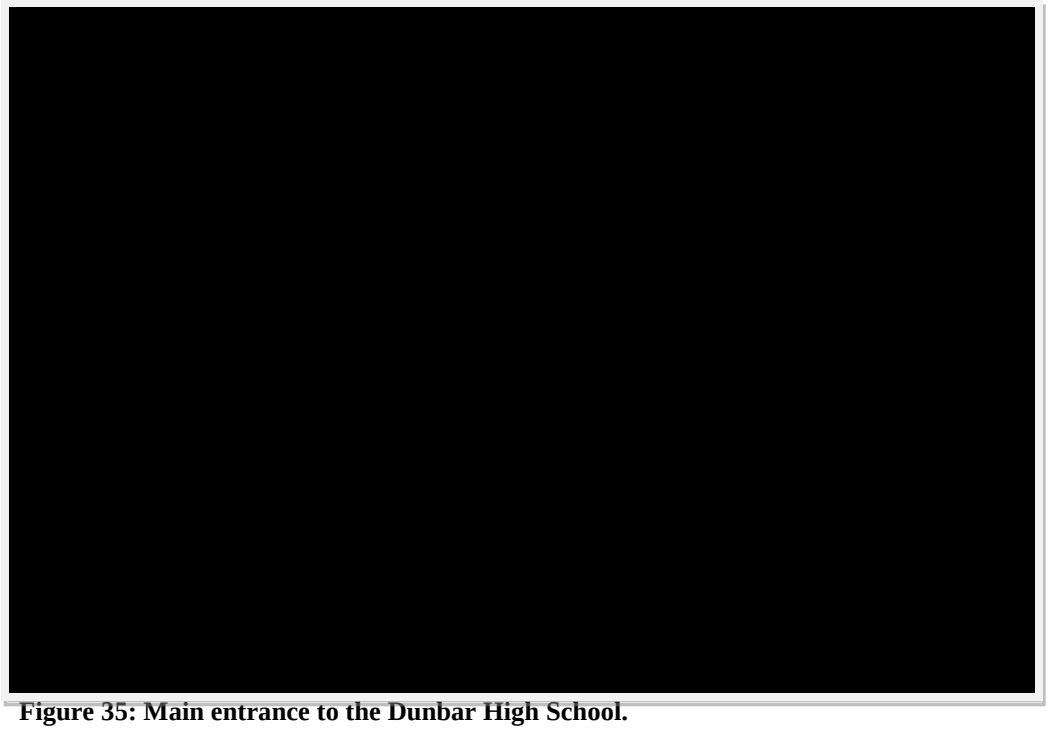


Figure 35: Main entrance to the Dunbar High School.
Image by Perkins Eastman

Dunbar High School, designed by Perkins Eastman, is an excellent example of how a school deals with the constraints and take advantage of the connections afforded by its urban context. The architects manage to create open and active interior spaces while dealing with similar security issues as the schools in Prince George's County. The school accommodates 1,100 students on a relatively small site of 10.7 acres in Washington, D.C.[84] Its innovative design has been recognized with several prestigious awards: AIA|DC Chapter Design Awards, Award in Architecture (2014); Congress for New Urbanism, Charter Awards: Best New Building (Civic)(2014), etc.[85]

[84] "Dunbar High School." Perkins Eastman, Accessed January 9, 2016. http://www.perkinseastman.com/project_3405944_dunbar_high_school
[85] Perkins Eastman, "Dunbar High School."

The school boundary is defined by buildings which surrounds it [Figure 34]. There are several public open spaces and a library—Carnegie Library—within a walking distance. The path to those destinations are lined by building fronts and is clearly defined [Figure 34]. This creates an "eyes upon the street" condition that, according to Jacobs, allows for a safe street. This alleviates the need for the school to be protective against the surroundings, which in turn, allows for an open, glazed main façade.

Alexandria Area High School

Figure 36: Diagram of nearby destinations and the edge condition of the paths from Alexandria Area High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

Figure 37: Approach to the main entrance of the Alexandria Area High School. Photograph by Corey Gaffer

Alexandria Area High School by Cunningham Group Architect is an example of a design achieved through a corporative process with its community. Over a hundred members of the community, which includes teachers, students, parents, district leadership, and businesses, were invited to participate a design workshop over several days.[86] The result is an "open, flexible design" where "traditional sized learning spaces are surrounded by areas that can be adapted for small or large group settings."[87] The built fabric of the neighborhood—dominated by single-family homes—is more similar to the four sites in Prince George's County than the Dunbar High School. The school accommodates 1,400 students on a more generously-sized site of 31.6 acres.[88]

The boundary Alexandria Area High School is clearly defined by the front of single-family homes on three sides (east, south, and west) and the back of single-

[86] "Alexandria Area High School / Cuningham Group Architecture." ArchDaily, last modified April 5, 2015, accessed January 9, 2016, http://www.archdaily.com/615957/alexandria-area-high-school-cuningham-group-architecture
[87] ArchDaily, "Alexandria Area High School / Cuningham Group Architecture."
[88] "Alexandria Area High School." Cuninghan Group Architecture, accessed January 9, 2016, http://www.cuningham.com/projects/education/pre-k-12-education#alexandria-area-high-school

family homes on one side (north). This creates a similar condition to Dunbar, and the school also features a generously-glazed front entrance [Figure 37]. Important to note is the lack of clear physical boundary, such as a fence, at this main entrance. In its place, a large, well-maintained grass field fronts the school and contrasts with the smaller lots of surrounding residential homes, adequately differentiating school property. Other than houses, there are only commercial destinations within walking distance, in the form of strip malls. The most direct path from the school is not very well-defined, especially as it approached the main road where the strip malls are located.

Suitland High School

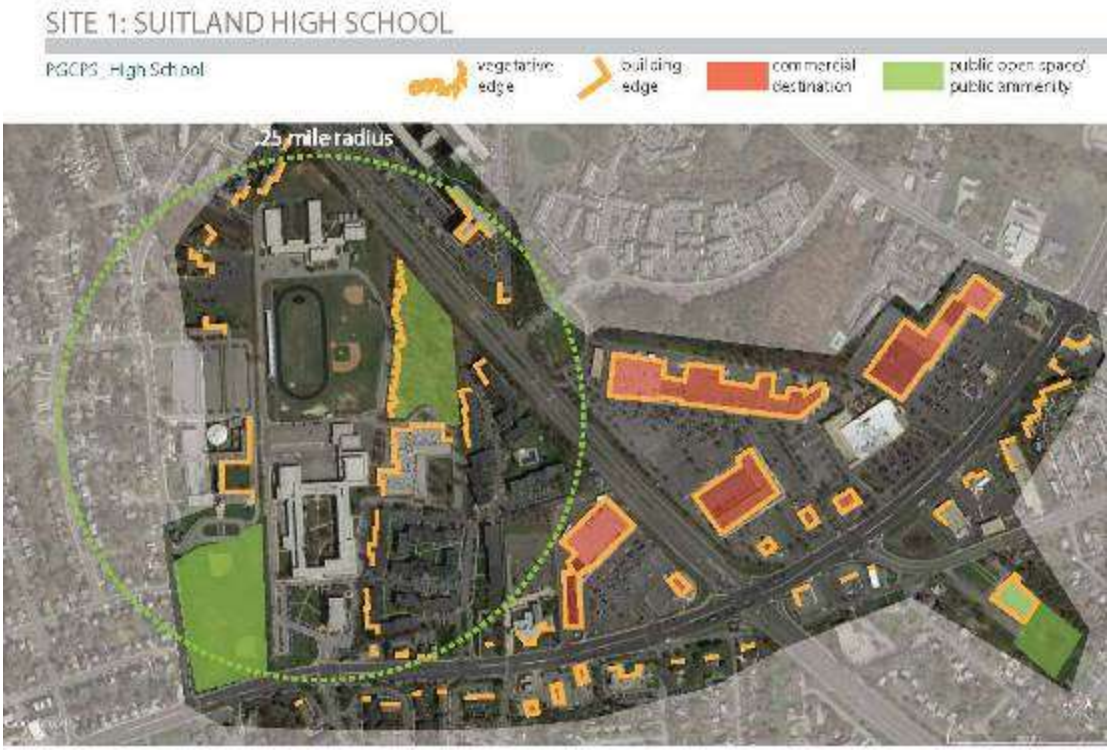


Figure 38: Diagram of nearby destinations and the edge condition of the paths from Suitland High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

The boundary of Suitland High School is not well-defined due to its porous nature. The school is edged by parking lots on the west side and the back of townhomes on the east side, which provides no form of community surveillance for the school. There is also a small park on the north-east side which lends to the porous nature of the boundary, but is also a potential amenity. One thing to note is that the high school is located immediately adjacent to Drew-Freeman Middle School, but that both schools have their own parking lots, outdoor athletic facilities, etc.

There are two green sites—a public park and outdoor athletic fields of a middle school—located adjacent to the school. In addition, there are plethora of commercial destinations, mostly consisting of fast food chains and strip malls, nearby. The porous nature of the school boundary continues with the streets' character, as there are only few buildings located alongside the path to the commercial destinations, which makes for an unpleasant walking experience [Figure 38].

Fairmont Heights High School

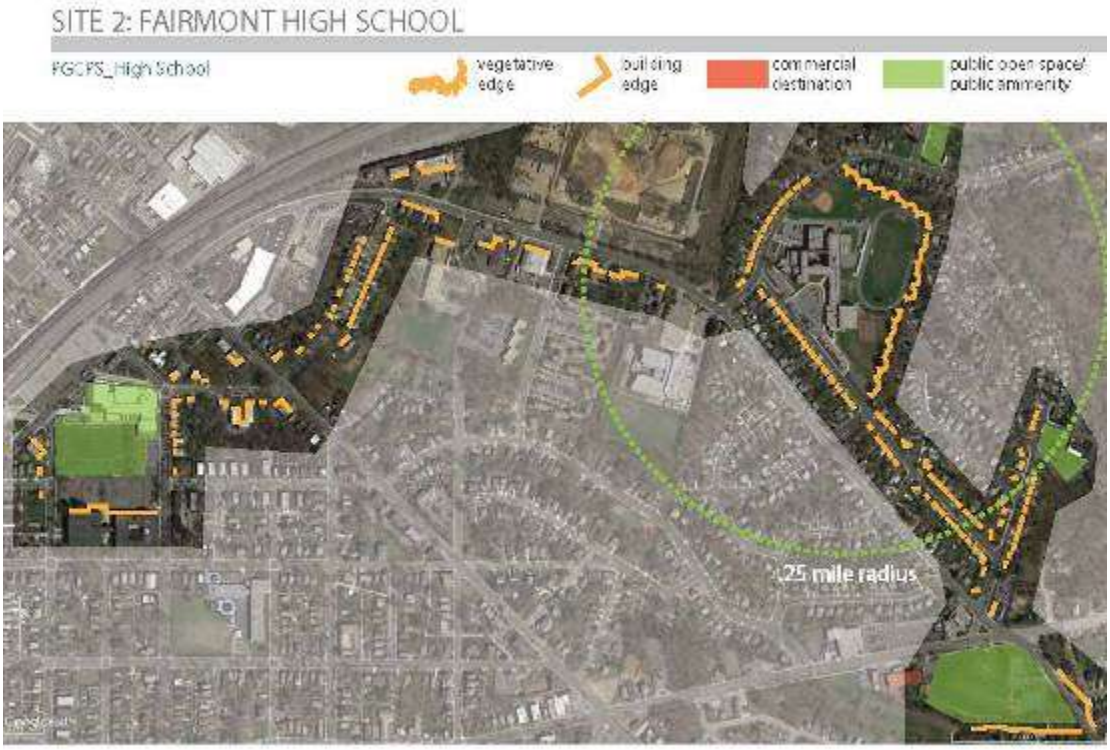


Figure 39: Diagram of nearby destinations and the edge condition of the paths from Fairmont Heights High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

Fairmont Heights High School has a clearly-defined boundary. The two eastern sides of the triangular site are edged by the fronts of detached single-family homes. This creates "eyes upon the street" condition on at least two sides where the entrances to the school are located. The two western sides are defined by the thin groves of trees behind which the backyards of detached single-family homes are visible.

There are several public amenities within the walking distance of the school. The most notable one is the Deanwood Neighborhood Library located about a mile's

walk from school. Other destinations include public playgrounds and parks on the east side. Most of paths to these destinations are contained in a sense that the street is defined by fronts of houses. Important to note is that there is a construction site close by on the west side, which breaks up the contained nature of the street to the library [Figure 39].

Central High School

Figure 40: Diagram of nearby destinations and the edge condition of the paths from Central High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

Almost all sides of Central High School are defined by groves of trees, which makes for a potentially dangerous condition as there is no sense of community surveillance upon the school grounds. The south side of the school property is defined

by backyards of homes, which does not contribute to the sense of surveillance, either. There are several public and commercial destinations located mostly on the eastern side of the school. Although the shortest path to the commercial destinations is not well-defined, the path through the secondary roads are well-defined by the fronts of homes [Figure 40].

Northwestern High School

Figure 41: Diagram of nearby destinations and the edge condition of the paths from Northwestern High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

"Eyes upon street" exists only on the northeastern side where the boundary is defined by front yards of homes. The remaining edges are defined by groves of trees and backyards of homes, which does not make for a suitable site. The main

destinations around the school consist of strip malls, and there are practically no public spaces or amenities within the walking distance. The paths to the destinations are not clearly defined due to the presence pf parking lots and vegetation. Looking at the lack of choices in destinations and the characteristic of the paths, Northwestern does not provide a suitable site for the thesis [Figure 41].

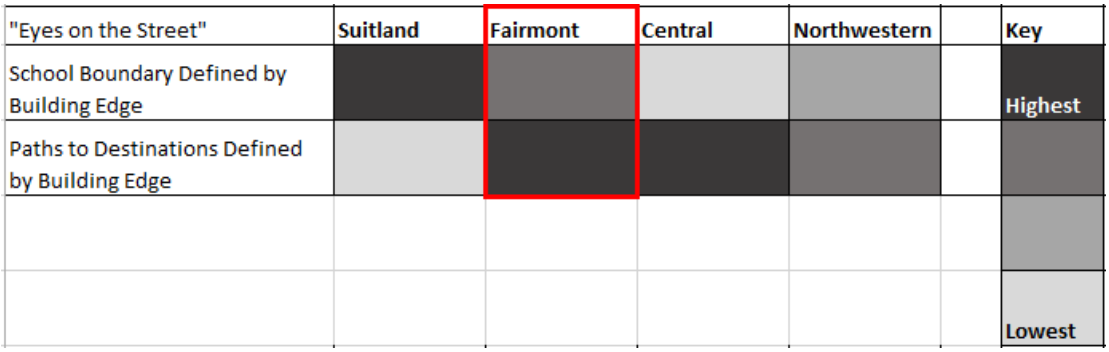


Figure 42: Edge condition comparison on four schools chosen for site analysis.
Chart by May Sein Win

Based on the criteria established for the condition of "eyes upon the street", Fairmont Heights High School again scored the best out of the four site analyzed for school selection. Also taken into consideration, as subset of the main criteria, are the type of destinations which are walkable from the school. Public parks and recreation centers are given higher considerations than commercial destinations because the former does not take money into account.

Prevalence of Crime	Suitland	Fairmont	Central	Northwestern		Key
Number of Shooting Incidents Reported Between 2011-2015						Highest
Density of Incidents in Relations to Area of the School District						
Proximity of the Incidents to the School						
Connectivity	**Suitland**	**Fairmont**	**Central**	**Northwestern**		**Lowest**
Proximity to a Metro Station						
Interconnected Primary and Secondary Roads						
Number of Nearby Civic Institutions						
Number of Nearby Educational Institutions						
"Eyes on the Street"	**Suitland**	**Fairmont**	**Central**	**Northwestern**		
School Boundary Defined by Building Edge						
Paths to Destinations Defined by Building Edge						

Figure 43: Overall comparison of all criteria for site selection
Chart by May Sein Win

Site Analysis of Fairmont Heights

Site Analysis

There are several modes of public transportation within the walking distance from Fairmont Heights High School [Figure 44]. Two bus lines (V14 and V15) run a block away from the south-west direction of the school. In addition, Cheverly Metro Station on the orange metro line is located less than half a mile from the school. The presence of different modes of public transportation and their close proximity means that people who do not own cars can reach the school. This increases the level of impact the design can have on the community since the access to school is not limited to only those who can afford cars. The thesis design of the school should also consider presence of several community centers nearby, such as Community Child Development Center and Deanwood Aquatic Center [Figure 45, Figure 63]. This potentially alleviates the need for Fairmont Heights school design to provide indoor and outdoor recreation areas for the community. As a result, the school can focus on serving other needs of the community, such as providing healthcare.

There are large paths of forested areas and undeveloped lots around the school, which provides an opportunity for design on a larger scale [Figure 46]. Currently, the forested areas are disconnected by roads and highways. The thesis would consider designing a trail path which connects these areas to transform these largely ignored vegetated areas into public amenity. Design considerations should go into how to highlight the stream at the north and to think about catchment ponds in the event of a storm [Figure 50]. In addition, the undeveloped lot directly east of

Fairmont Heights High School will be considered as a location for some of the programmable areas of the thesis high school design.

The main entrance to the school is located on the south-west side. School buses and student who are walking to school share the same entrance, while cars have multiple entrances to the parking lots [Figure 47]. The single entrance for people walking and school buses creates a potentially dangerous situation as the buses, which have large blind spots, can hit a distracted student. The parking lots (1.97 acres) are locates on the south-west perimeter, and act as a boundary with insulate the school from the street [Figure 48]. The outdoor athletic spaces (5075 acres) are located on the north-east side behind the school and bordered on one side by backyard of homes. The contrast between "eyes upon the street" nature of the west half of the school boundary where parking lots are located and backyard condition of the east boundary where the athletic fields are can be seen in Figure 49.

The area immediately surrounding the site is zoned residential, made up of single family homes [Figure 51, Figure 52]. There is a strong present of light industry; most of the businesses near the site is related to construction. The area next the metro stop directly to the north-east of the site is zoned to house Transit Oriented Development (TOD). The mixed-use, high density nature TOD should be taken into account for the design because it will drastically change fabric of the current neighborhood.

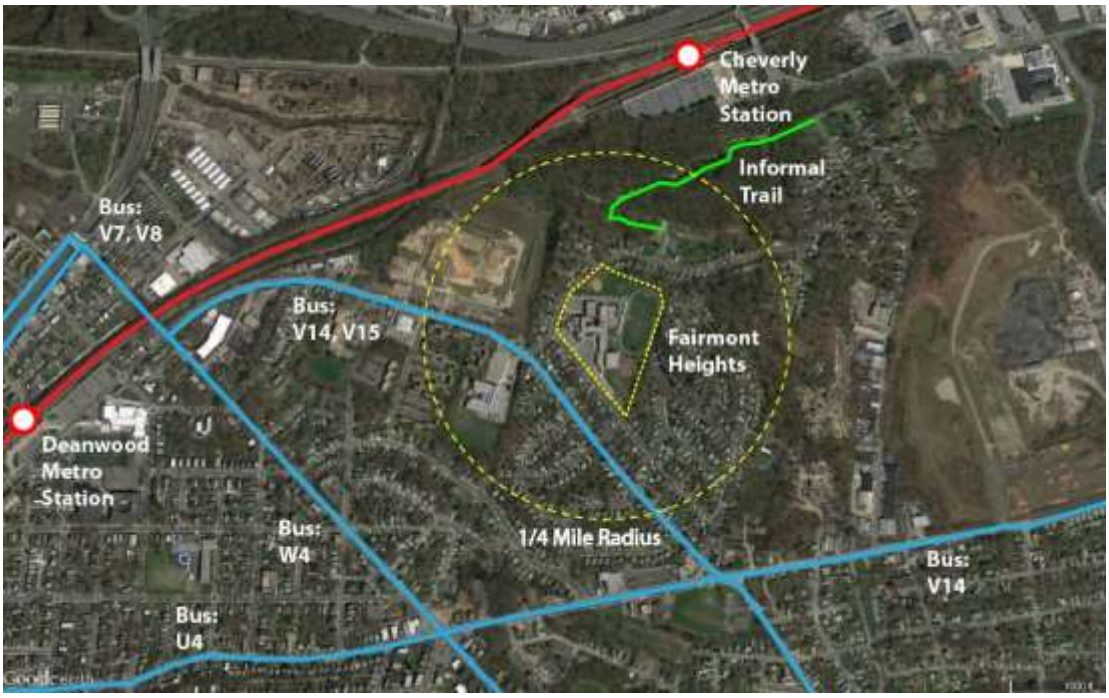


Figure 44: Public transportation and trail paths
Diagram by May Sein Win
Image underlay from Google Earth Pro

Figure 45: Nearby community centers and community-serving locations
Diagram by May Sein Win
Image underlay from Google Earth Pro

Figure 46: Undeveloped lots and forested areas for possible design
Diagram by May Sein Win
Image underlay from Google Earth Pro

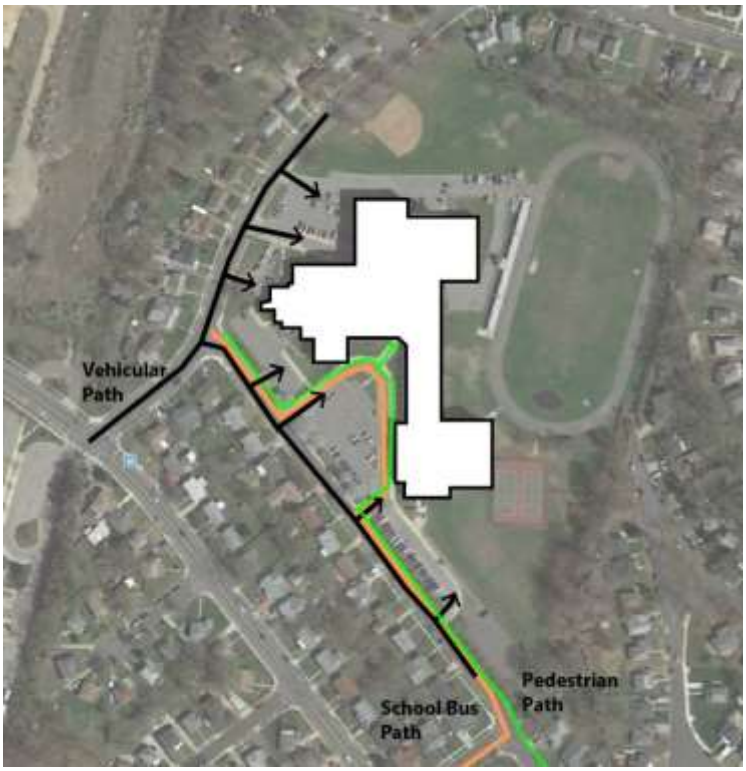


Figure 47: School bus, cars, and pedestrian paths into the school property
Diagram by May Sein Win
Image underlay from Google Earth Pro

Figure 48: Parking and outdoor athletic space configuration
Diagram by May Sein Win
Image underlay from Google Earth Pro

Figure 49: Front-facing edge (orange) vs. backyards (green)
Diagram by May Sein Win
Image underlay from Google Earth Pro

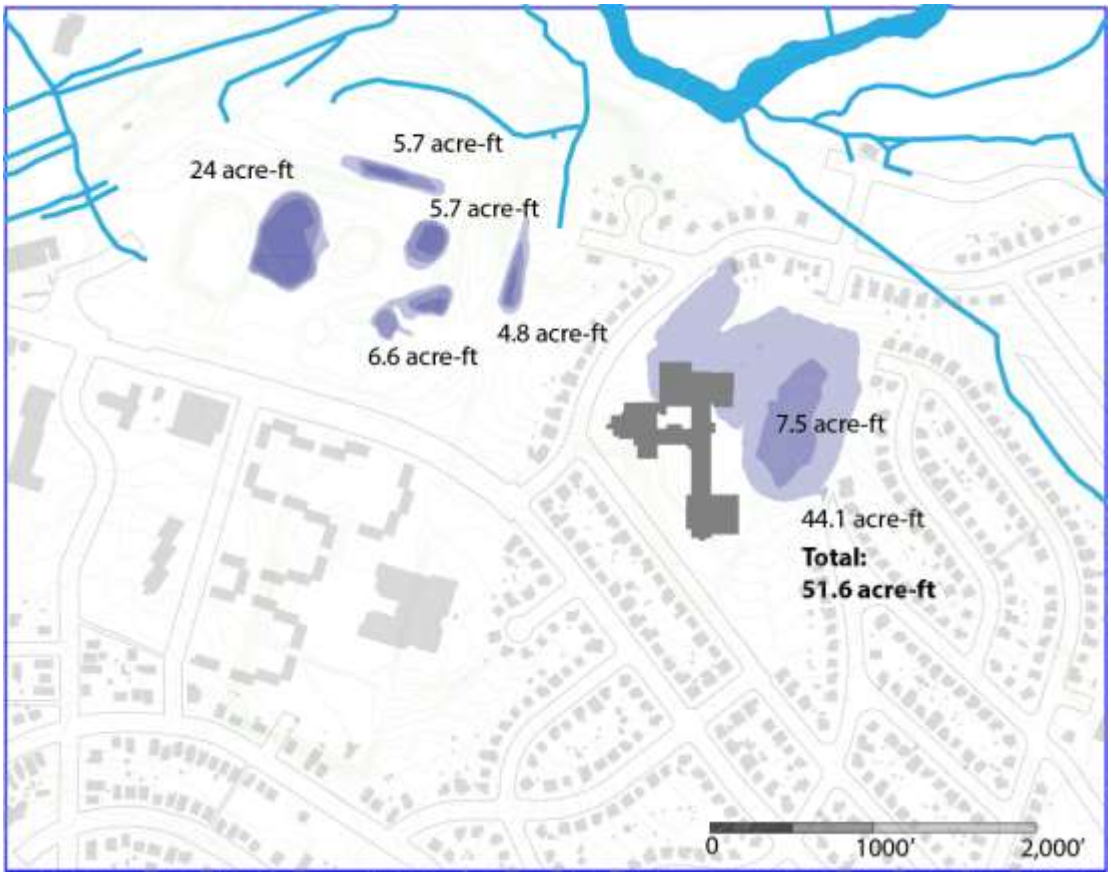


Figure 50: Nearby water bodies and water catchment capacity study
Diagram by May Sein Win
Image underlay from Google Earth Pro

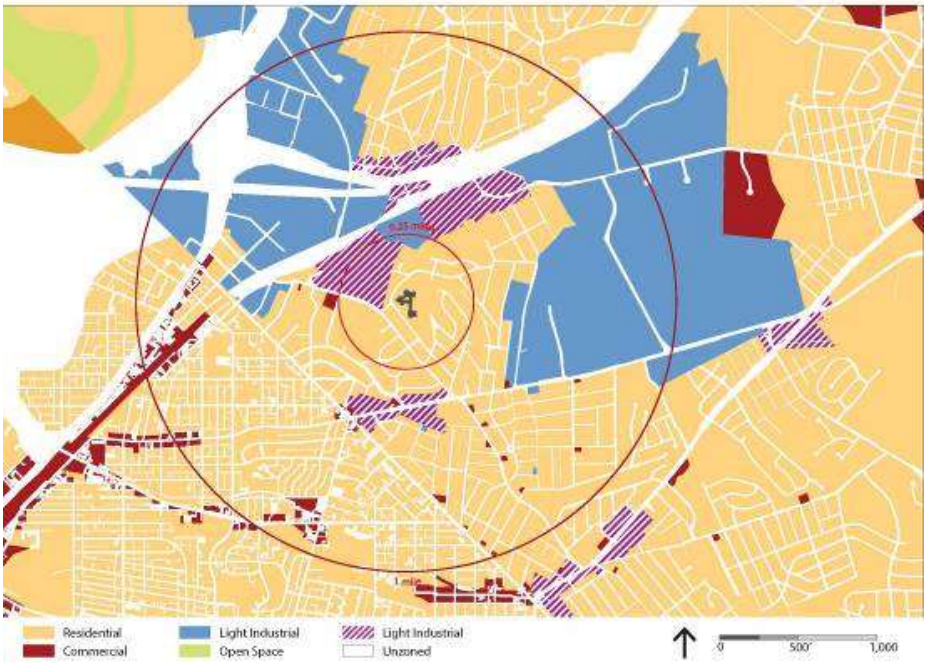


Figure 51: Zoning/ Use map of the region surrounding Fairmont Heights High School.

Map generated by May Sein Win using ArcMap GIS

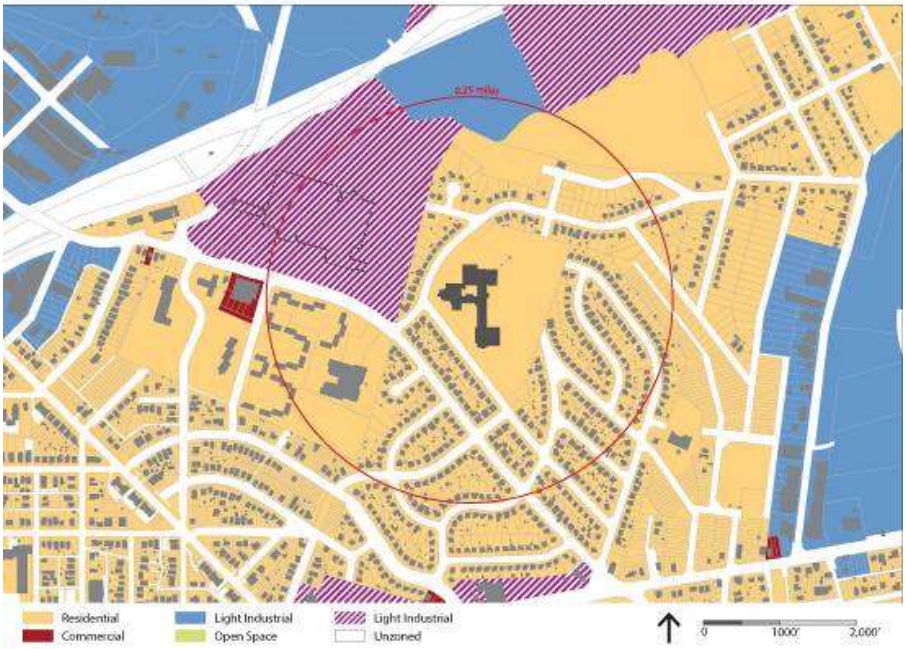


Figure 52: Zone/Use map of the neighborhood surrounding Fairmont Heights High School. Map generated by May Sein Win using ArcMap GIS

Figure 53: Primary, secondary, and tertiary paths; and intersections in the region surrounding Fairmont Heights High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

Figure 54: Places of interest—and the shortest walking paths—in the region surrounding Fairmont Heights High School.
Diagram by May Sein Win
Aerial Image from Google Earth Pro

Site Pictures

Figure 55: Site pictures key.
Annotations by May Sein Win
Aerial Image from Google Earth Pro

Figure 56: Homes' fronts toward the school. Image by May Sein Win

Figure 57: View of Quarry Avenue (Top); East façade of school (Bottom).
Image by May Sein Win

Figure 58: Tennis courts.
Image by May Sein Win

Figure 59: Site pictures key.
Annotations by May Sein Win
Aerial Image from Google Earth Pro

Figure 60: Approach toward the school from east.
Image by May Sein Win

Figure 61: Primary entrance to school (Top); Classroom door propped open (Bottom)
Image by May Sein Win

Figure 62: Building maintenance area.
Image by May Sein Win

Program

Prince George's County Guidelines

Prince George's *Prototype High School Educational Specifications*[89] contains an extensive and specific guidelines relating to program of a high school. Although the document is prescriptive by nature, this thesis will not use it as the sole guideline for program outline. Instead, it will serve as a starting point of comparison to programs of other schools. Program list, square footage requirements, and configuration recommendation given in the document would be analyzed and questioned in comparison.

Program Size

The document specified twelve program types in the capacity summary for a 1700 student school[90]:

1. Core Academic/ Science/ Special Ed.
2. ESL
3. PE/ Indoor
4. Performing Arts
5. Media Center
6. Visual Arts
7. Student Dining & Food Services
8. Career/ Academic Support
9. Administration/ Health

[89] Prince George's County Public Schools, "Prototype High School Educational Specifications"
[90] Prince George's County Public Schools, "Prototype High School Educational Specifications": 24

10. Guidance/ Student Services

11. Building Support Area

12. Building Maintenance

These programs could be categorized into academic classrooms, community-use spaces, administration/ health/guidance, and corridors / building support [Figure 63]. This allows for a clearer idea of how much space is allocated for programs such as cafeteria, gymnasium, etc., which the community could potentially use.

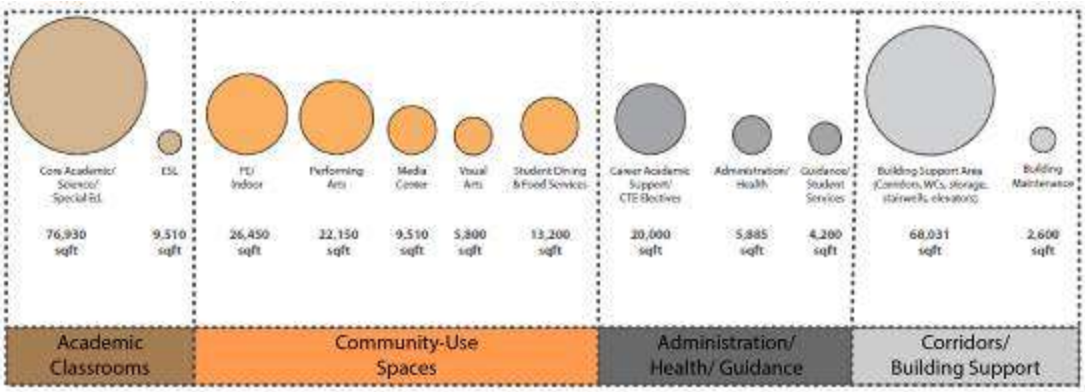
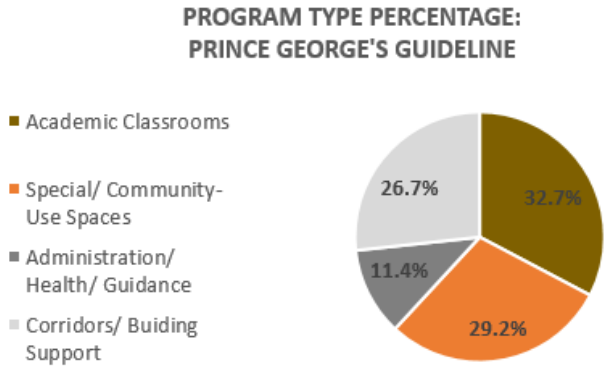


Figure 63: Square footage recommendation—by Prince George's County Public Schools Guidelines for High Schools—based on 1,700 student capacity.
Image by May Sein Win



Academic classrooms take up the largest portion of the program allocation (32.7%), according to the PGCPS guidelines. The program spaces which could be used by the community also makes up a substantial portion (29.2%), which space allocation for corridors and building support coming in third (26.7%).[91]

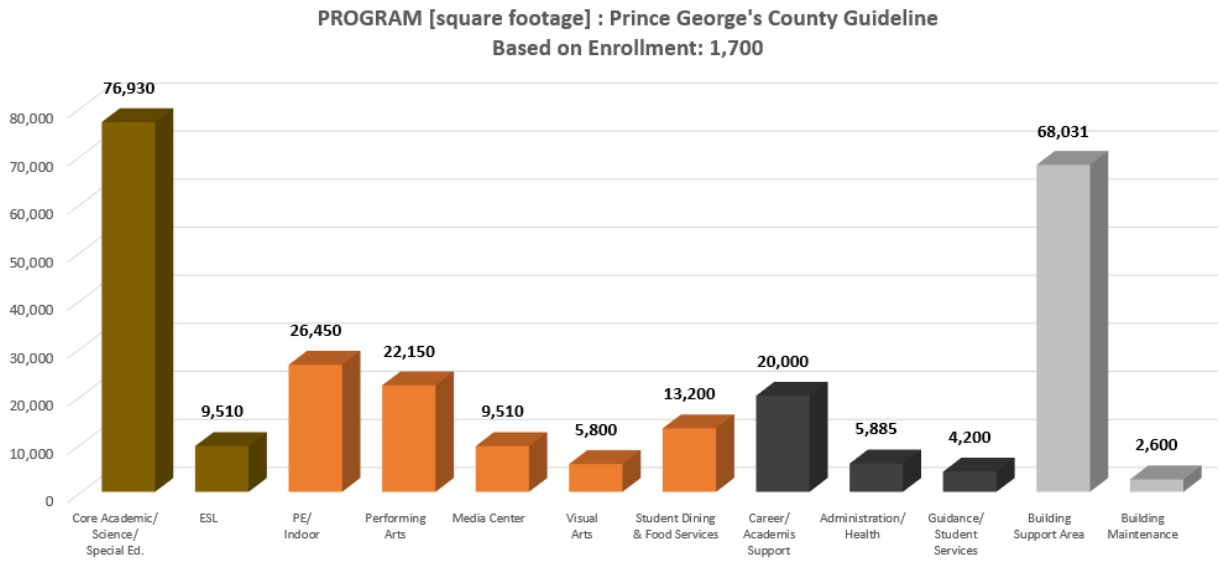


Figure 64: Square footage recommendation—by Prince George's County Public Schools Guidelines for High Schools—based on 1,700 student capacity.
Chart by May Sein Win

[91] Prince George's County Public Schools, "Prototype High School Educational Specifications": 24

Program Configuration

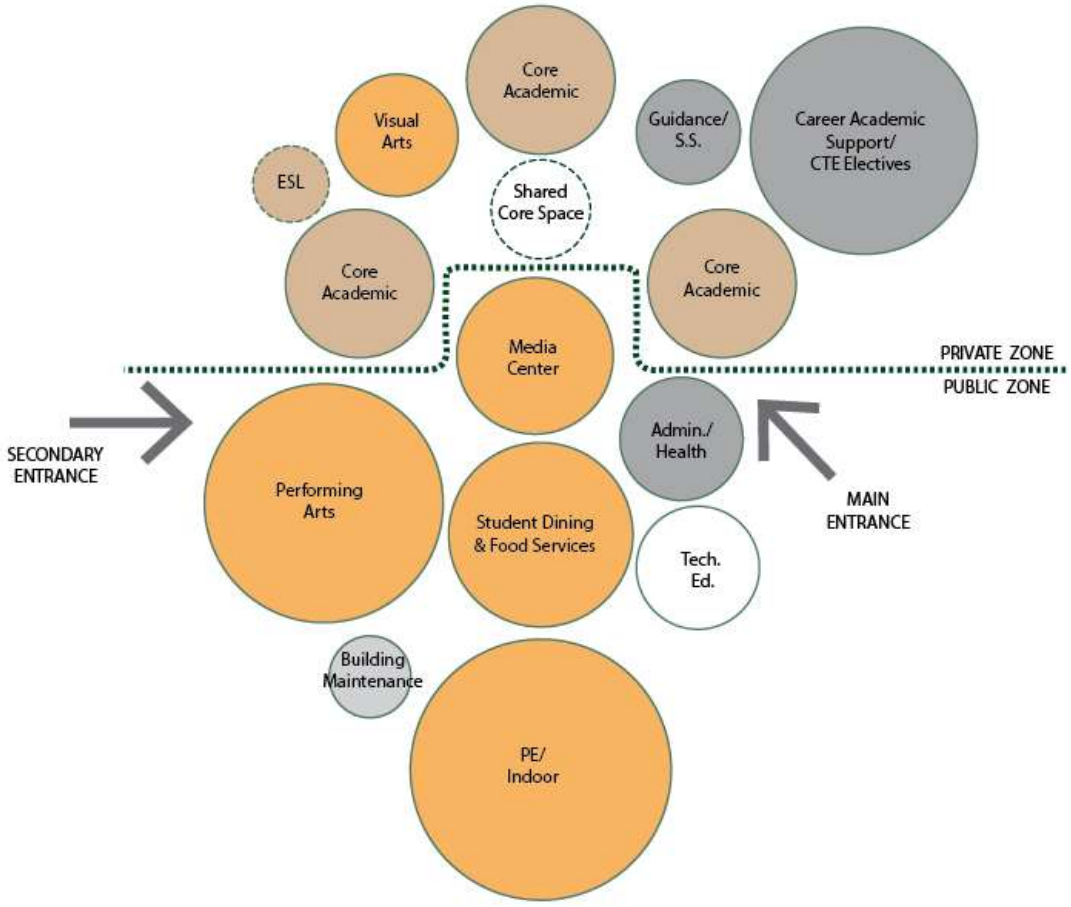


Figure 65: Program layout recommendation by Prince George's County Public Schools Guidelines for High Schools.
Diagram by May Sein Win

The *Prototype High School Educational Specifications* differentiates between a private zone and public zone. It specifies that "academic learning communities should be located in the quite areas of the building" and the "noisier areas [should be] grouped near the parking and public areas".[92] This configuration makes it easier for

[92] Prince George's County Public Schools, "Prototype High School Educational Specifications": 5

the community-use areas to be isolated from the academic areas during the after-hours use.

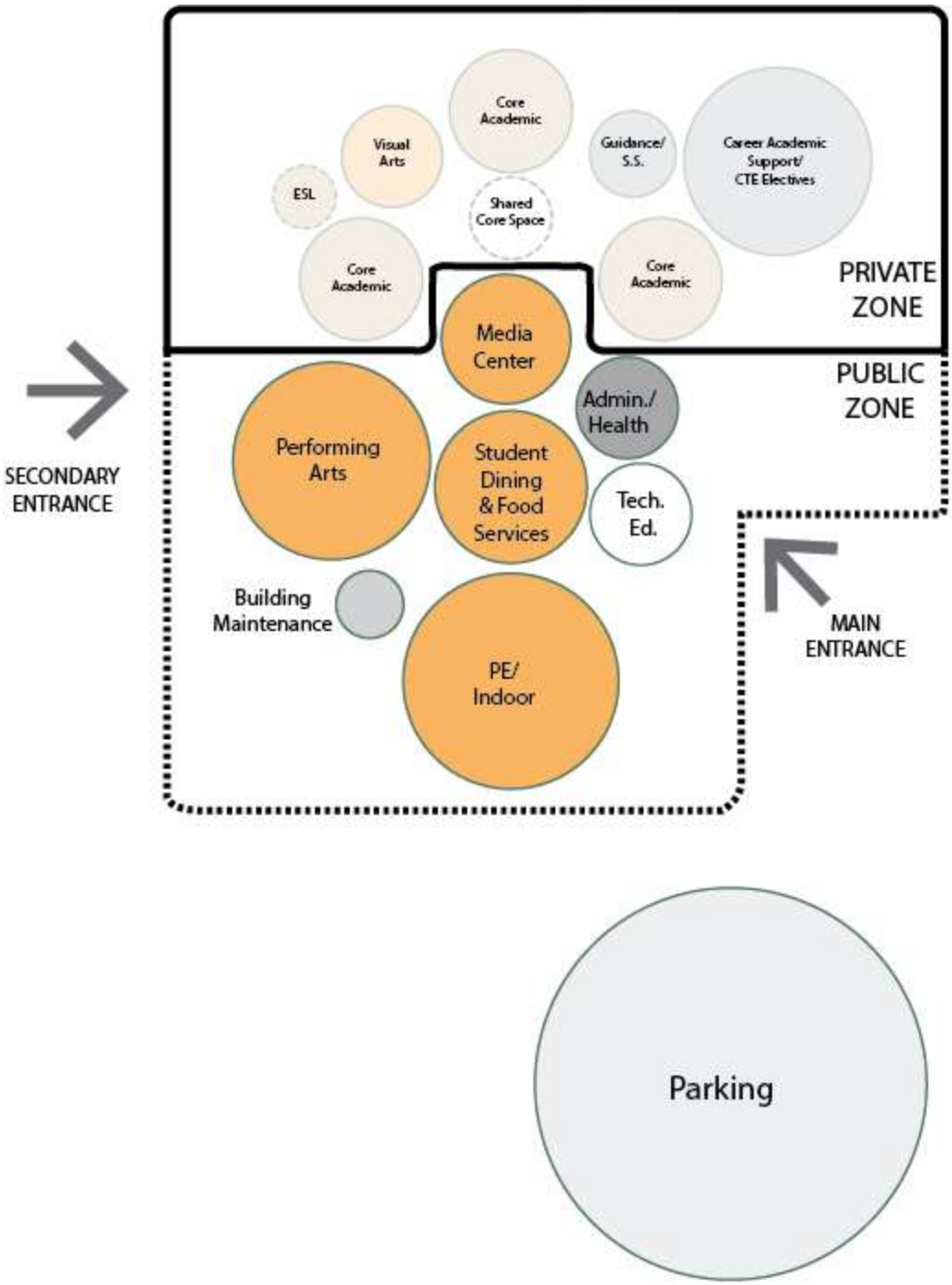


Figure 66: Program layout for a clearly defined public and private zone—recommended by Prince George's County Public Schools Guidelines for High Schools.
Diagram by May Sein Win

The same sense of the divide between private/public, academic/community-use spaces carry onto the program configuration relating to parking and entrances. The document recommends that the both the primary and secondary entrances lead the visitor into the public zone. The guide specifies that "all visitors should be able to identify a 'single point of entry' to the school."[93] Furthermore, the main office—part of the administrative area—should be located at the primary point of entry so that visitors could be monitored and registered accordingly.[94] It also recommends the use of fence, particularly at the places of heavy vehicular and pedestrian traffic, and use of high trees and low bushes to deter hiding [Figure 67].[95]

Figure 67: Suggested use of foliage by PGCPS.
Diagram by May Sein Win.

[93] Prince George's County Public Schools, "Prototype High School Educational Specifications": 7
[94] Prince George's County Public Schools, "Prototype High School Educational Specifications": 7
[95] Prince George's County Public Schools, "Prototype High School Educational Specifications": 15

Initial Precedent Studies

Schools for initial precedent studies were chosen based on the recommendations from professors, availability of documents, and design recognitions that the school received. Diagrams of program configuration and access points help inform of the relationship between traditionally public special programs (which may be used by the public) and traditionally private academic classrooms. The glazing diagram and circulation diagrams shows how the main spaces connect to each other and how much visual connection the hallways have to the outdoors.

Saunalahti School, Finland

Professor Peter Noonan recommended the Saunalahti School in Espoo, Finland because of the strategic employment of glazing to take advantage of the scarce sunlight in the Scandinavian region. VERSTAS Architects designed the school in such a way that the circulation spaces seamlessly converge into a light-filled gathering space that can house large numbers of people.[96]

Special program spaces (cafeteria, auditorium, and library) are located at center of the two "arms" and act as an anchor for the school [Figure 84]. This makes it different from the typical configuration of many American public schools where the special programs are located on one side. The advantage of Saunalahti school design is that it gives the school a clearer central focus, although it makes it difficult for the

[96] "VERSTAS Architects' Saunalahti School Exemplifies Finnish School Architecture." Archinect, last modified July 24, 2013, accessed November 10, 2015, http://archinect.com/news/article/77844999/verstas-architects-saunalahti-school-exemplifies-finnish-school-architecture

private classrooms areas to be closed off during after-hour use. It is important to note that unlike public high schools of Prince George's County, this school in Finland might not have the same obligation to allow the public to use its spaces.

The primary access leads the visitor straight to the central open "canteen" space and the secondary entrance leads the visitor to academic classrooms. This shows a dramatically different attitude from American schools, where the visitor has to cross a vestibule and then register at the main office. Due to the scarcity of natural light, glazing makes up the majority of the enclosure [Figure 69]. The circulation spaces are located next to the windows which directly looks out into the outdoor.

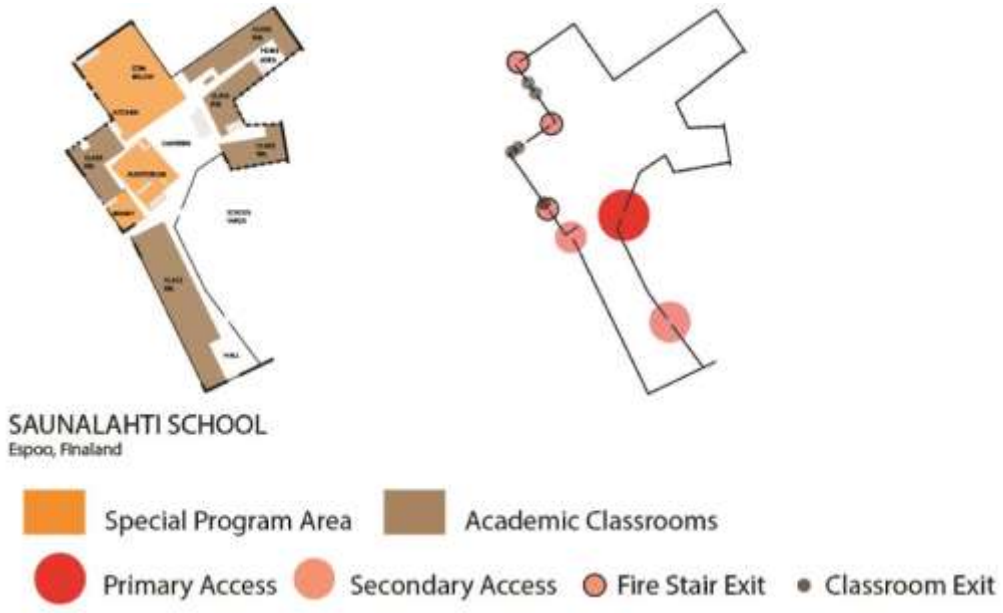


Figure 68: Program configuration diagram (left) and access points diagram (right) of Saunalahti School Diagram by May Sein Win

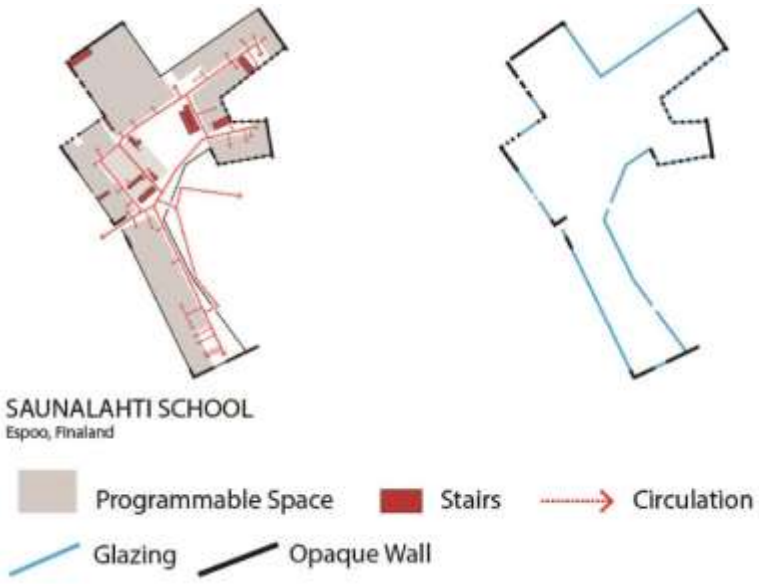


Figure 69: Circulation diagram (left) and glazing diagram (right) of Saunalahti School Diagram by May Sein Win

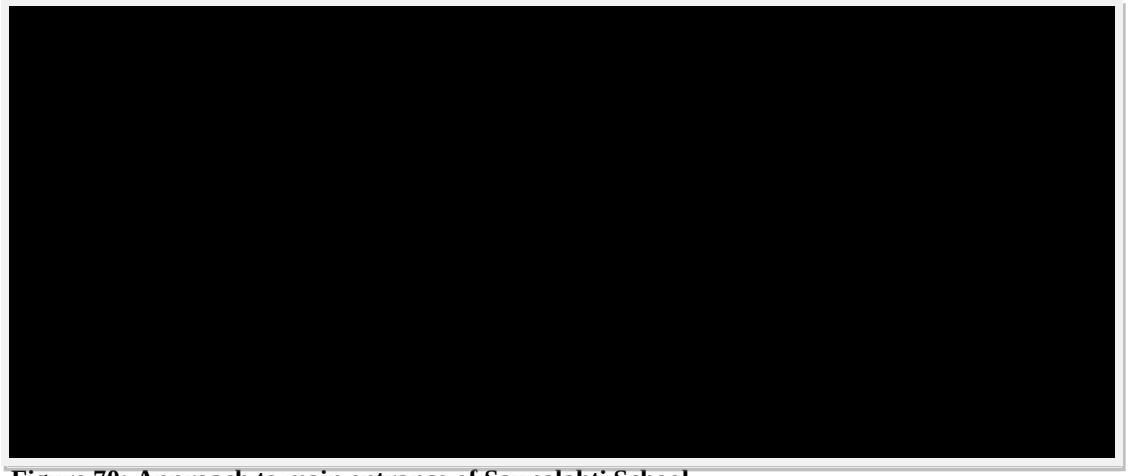


Figure 70: Approach to main entrance of Saunalahti School.
Photograph by Andreas Meichsner

Figure 71: Light-filled classroom of Saunalahti School.
Photograph by Andreas Meichsner

Comparison to American School Typology

The two other schools chosen for the initial site analysis are located in the United States and thus, presumably deal with similar security constraints as the site chosen for thesis in Prince George's County. Alexandria Area High School is an excellent example of how the architect subtly changed the traditional American high school typology to allow for an "open, flexible design" where "traditional sized learning spaces are surrounded by areas that can be adapted for small or large group settings."[97] Analysis of the new Fairmont Heights High School by Grimm + Parker were conducted in order to see the strategies that are the most applicable to the thesis site.

[97] ArchDaily, "Alexandria Area High School / Cuningham Group Architecture."

In comparison to Saunalahti School, both Alexandria Area High School and New Fairmont Heights High School design has a clear divide between the special program area and academic classrooms [Figure 72]. In all three cases, primary entrances are clearly defined and all three has doors which directly connects some classrooms to the outside [Figure 73]. Circulation and glazing are treated drastically differently between the Scandinavian and American schools [Figure 74]. In the Scandinavian schools, majority of the circulation is connected to the outdoors through glazing [Figure 75]. In contrast, both American school have hallways located between enclosed rooms and does not have views to the outside. One reason why this might be is because of the need to create a compact design due to cost of heating/cooling. This configuration ensures that the classrooms and other spaces receive adequate light while keeping the surface area of the building as low as possible.

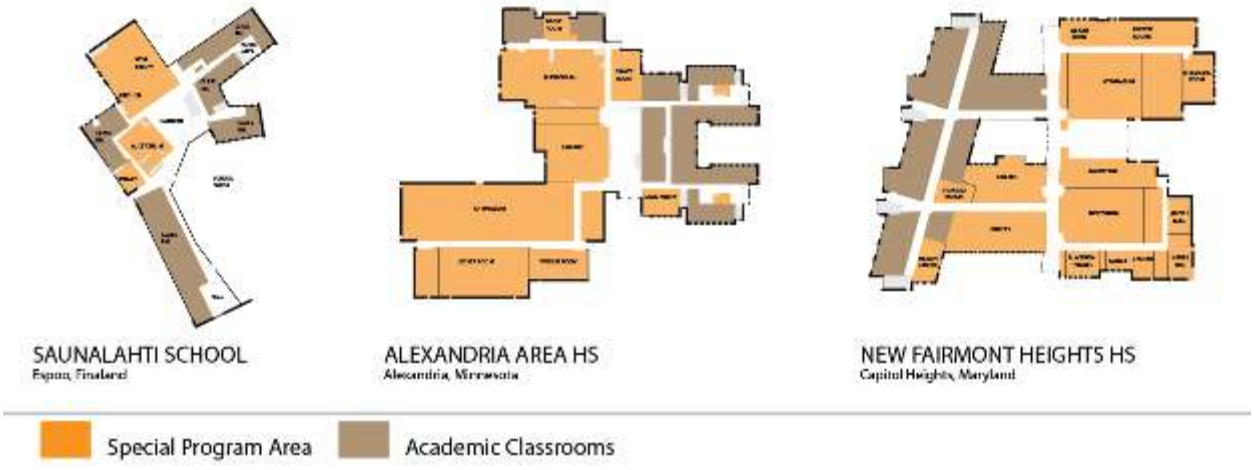


Figure 72: Comparison of special program area (public) and academic classrooms (private) Diagram by May Sein Win

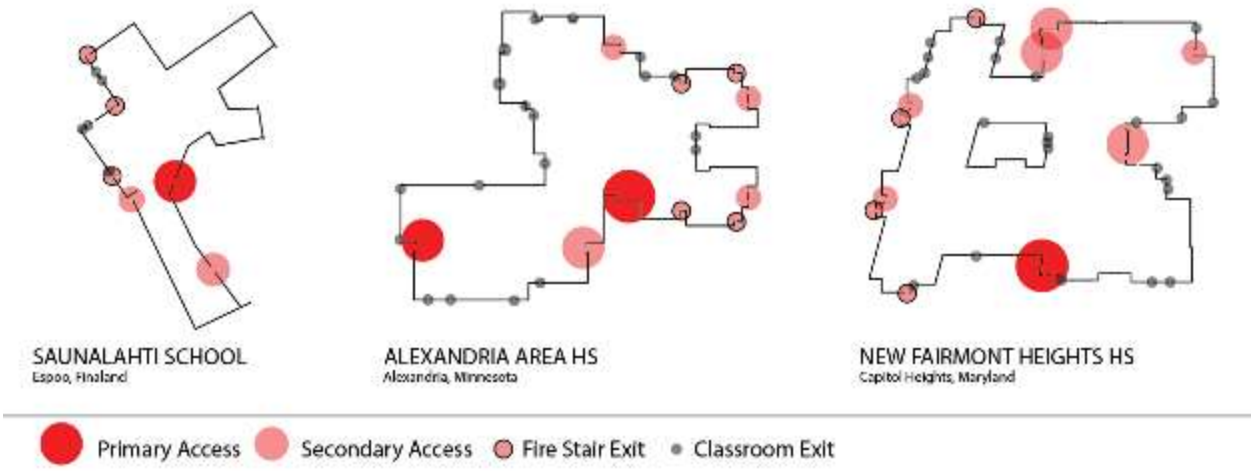


Figure 73: Analysis of different class of access points
Diagram by May Sein Win

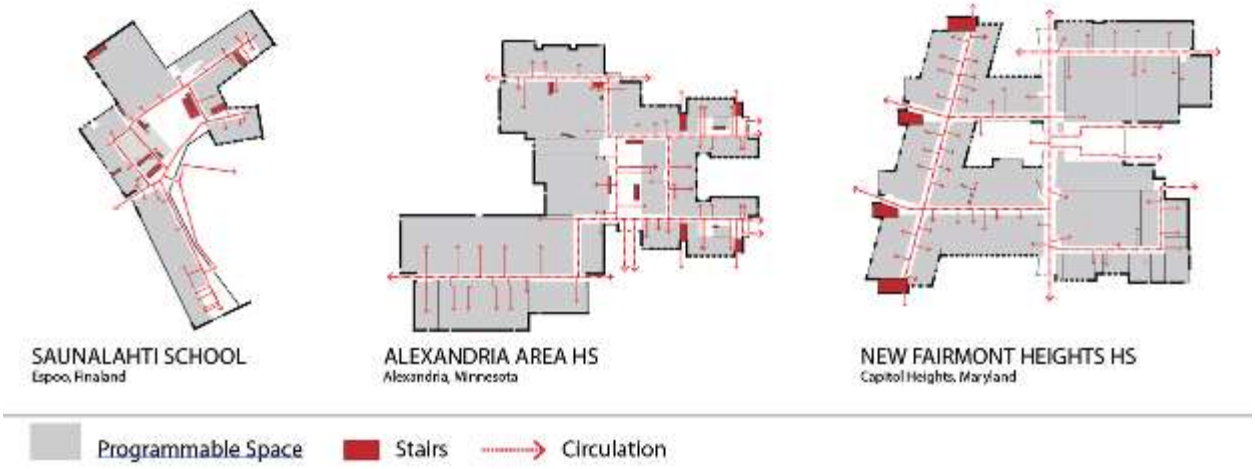


Figure 74: Analysis of vertical and horizontal circulation
Diagram by May Sein Win

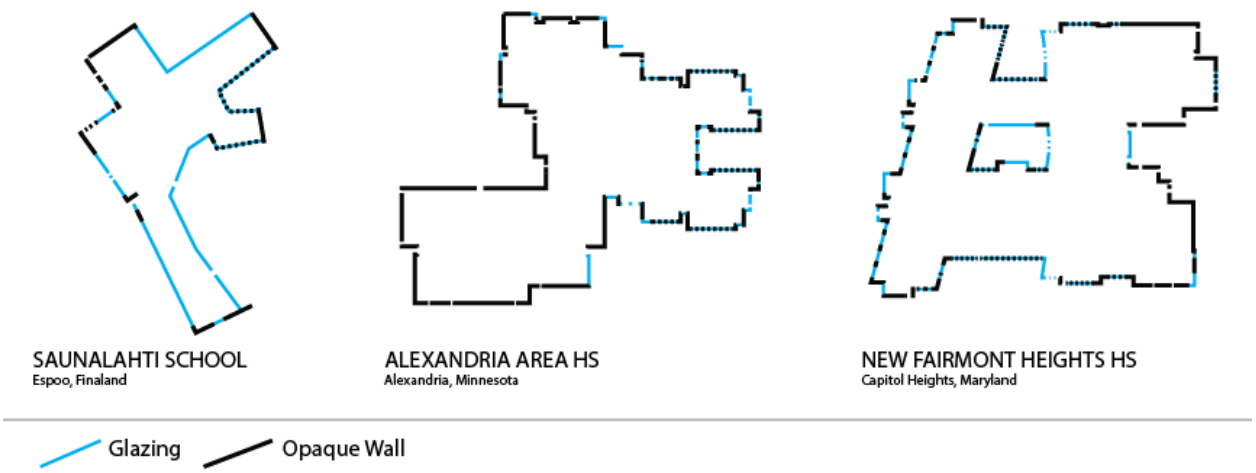


Figure 75: Comparison of glazed and opaque walls.
Diagram by May Sein Win

Site: Precedent Studies

The initial precedents studies revealed a wide range of design strategies as it relates to general pattern of access points, circulation, and glazing. The next set of precedent studies for program were conducted on two local schools which were recently built and are located in two very different site conditions: Oxon Hill High School and Roosevelt Senior High School. Roosevelt Senior High School, located in Washington, D.C., shows how a school can house similar number of students on a relatively small site. It is also an excellent example of how a school integrates itself into the existing fabric, instead of retreating from it. The design of the New Fairmont Heights High School by Grimm + Parker was analyze to see the strategies that are the most applicable to the thesis design. One important thing to note is that the New Fairmont Heights is planned to be located approximately 1.3 miles north-east of the

current Fairmont Heights High School[98]. The current Fairmont Heights will be the site for the thesis project.

Industrial and Residential: New Fairmont Heights High School

Figure 76: Diagram of the approach and use of site—New Fairmont Heights High School.
Diagram by May Sein Win
Aerial image by Google Earth Pro

The mixture of light industrial to the west and residential to the east of the new site of the new Fairmont Site, which is about 1.3 miles from the original site, resembles that of the current location of Fairmont Heights. The outdoor athletic

[98] "Grunley Begins Construction on $78.8M Fairmont Heights High School Replacement Project." Grunley, last modified August 10, 2015, accessed December 10, 2015, http://www.grunley.com/news/2015/08/grunley-begins-construction-788m-fairmont-heights-high-school-replacement-project-0

spaces are located at the west insulate the school the noises from the light industry area. The special program spaces are located toward the street which spatially connect them to the community. However, there is only one way into the site, which is shared by both pedestrians and cars, which may not be good.

Expansive Site: Oxon Hill High School

Figure 77: Diagram of the approach and use of site—Oxon Hill High School.
Diagram by May Sein Win
Aerial image by Google Earth Pro

Oxon Hill High School provides an excellent example of the school that integrates the special program areas which could be used by the community throughout the school. The administrative areas act as a core and the visitors reaches this space directly upon entering through the main entrance. Another important thing

which can be learn from this school is that the special program spaces vary in size and serve multiple functions, such as classrooms and meeting rooms. Although the building plan integrates the community-serving spaces well, the layout of the site isolates itself from the surrounding neighborhood.

Urban Location: Roosevelt Senior High School

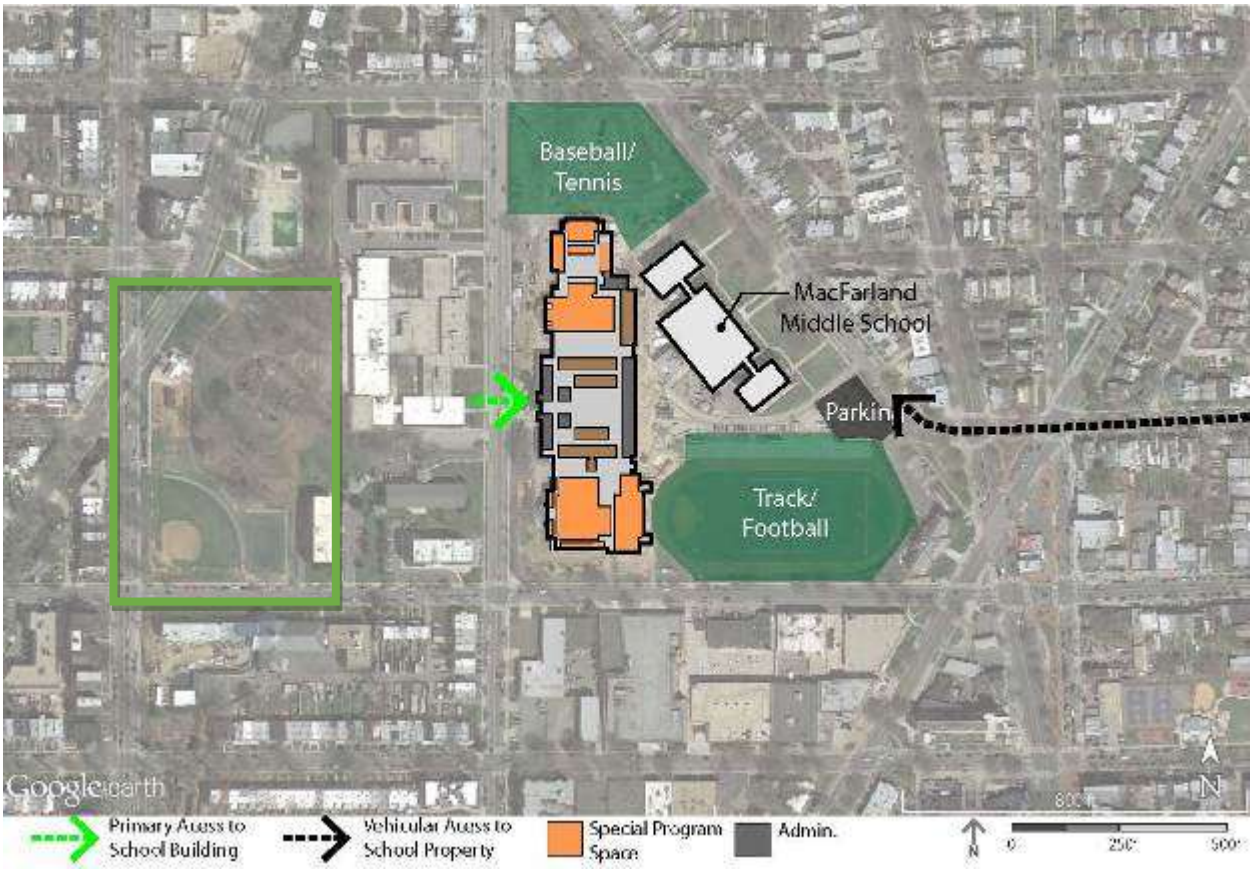


Figure 78: Diagram of the approach and use of site—Roosevelt Senior High School.
Diagram by May Sein Win
Aerial image by Google Earth Pro

Roosevelt Senior High School uses the compact site, shared with McFarland Middle School, to create a school which takes advantage of the amenities offered by the urban setting. The school capacity is comparable to new Fairmont Heights and Oxon Hill, but the site is not large enough to house the outdoor athletic spaces of the

other two. The school orients the front entrance toward the baseball field and park located across the street, establishing a spatial connection. This makes for a smoother transition for the students from the school to use the field across the street. Furthermore, locating the school along the street reinforce the existing urban grid and help to integrate the school into the neighborhood.

Thesis Program

1. Program Objectives

This thesis maintains that schools should strengthen interpersonal and critical thinking abilities of students so that they can realize their full potential as an engaging citizen, and not just a member of a workforce. Thus, the programmatic design objective of the high school design is to create a stimulating learning environment for students which engages the surrounding community of Fairmont Heights High School. In addition, it will aim to prevent most common sources of stress and violence, such as bullying.

The current Prince George's County High School Guidelines alludes to the need for a stimulating and engaging learning environment by listing out environmental factors which effect students' academic performance such as: lighting, acoustics, environmental and air quality, and ergonomics. The thesis design aims to use these factors above as a basis for creating academic spaces which are interactive. For example, as the study showed that students' performance are higher when there is abundance of natural light, the design will employ strategic placement of windows, skylights, and shading devices to ensure natural light without glare.

In addition to addressing the basic environmental factors, such as light, sound, air, listed above, the thesis will also consider the different learning styles of students. The traditional classroom layout, where all of the students' desks are facing the same direction towards the blackboard or whiteboard, ignores the fact that some students learn the best when they are interacting with other students. Furthermore, the static nature of this arrangement does not give the students control over their environment. It also doesn't give the teachers much flexibility in arranging furniture which suites certain activities the best. This thesis will consider introducing different furniture types within a classroom to add more flexibility and enlarging the traditional classroom size to accommodate greater variety of activities and subjects.

The school as a whole will serve as a welcoming environment to residents in the community. One way to do this is to offer a wider variety of spaces, from large-scale auditorium to a small-scale classrooms, to meet a wide range of community needs. The most pressing need of the community is the need for healthcare, as 16.5 percent of people under age sixty five is without health insurance in Prince George's county—which is almost as twice as the state's (8.9 percent). Thus, one of main programmatic objective is to offer more health-related spaces for both the students and the community. As a reflection of the interconnected link between the neighborhood and the school, the design will also aim to locate the community-use spaces in a more integrated manner throughout the school.

Bullying is one of the most prevalent form of violence which drastically changes the way an affected student perceives the school environment. Although bullying occurs in all areas of school, it is more prevalent in unsupervised spaces,

such as hallways and stairs. Bullying is also tied to poor sense of community within the school. Thus, the thesis will focus on rethinking the hallways and stairs so that they become gathering spaces that reinforce a sense of connection among students. Furthermore, strategic placement of administrative areas and teacher lounges can provide supervision to these areas.

- Classrooms should have abundant natural light, properly insulated acoustically, and the air quality should be properly monitored
- Classrooms should be large enough to accommodate group activities as well as lecture-style program. Variety in furniture should reflect this multi-use function of classrooms.
- Health-related programmable spaces should be included to serve the community as well as students
- There should also be classroom-size spaces and traditional special-program spaces such as auditorium and gymnasium to serve the community
- Hallways should have spaces of expansion to accommodate gathering spaces for students

3. Program Summary

100	**Academic**			**Subtotal**	**50650**
		Space	Qty.	S.F.	Total S.F.
	101	Academic Classrooms	30	1000	30000
	102	Academic Large Studio	6	1100	6600
	103	Special Need Classroom	2	850	1700
	105	Meeting Rooms	10	120	1200
	106	Foundation of Technology	2		3450
		Learning Classroom		900	
		Material Storage		1650	
	107	Science Classrooms/Lab	5	1400	7000
	108	Science Prep	3	200	600
	109	Storage, Chemical	1	100	100
200	**ESL/Community**			**Subtotal**	**8950**
		Space	Qty.	S.F.	Total S.F.
	201	Classrooms ESL	7	850	5950
	202	Classroom for General Community	2	1000	2000
	203	Blended Learning Lab	2	500	1000

300	**Physical Education**			**Subtotal**	**22758**
		Space	Qty.	S.F.	Total S.F.
	301	Lobby	1	2250	2250
	302	Gymnasium	1	6800	11900
		Seating		5100	
	303	Concession	1	300	300
	305	Fitness/ Weight Room	1	1800	1800
	306	Multi-purpose/ Wrestling Room	1	1800	1800
	307	Laundry	1	150	150
	308	Locker Room/ Shower	2	1800	3600
	309	Offices	3	150	450
	310	Showers/ Changing Room for Staff	2	100	200
	311	Storage	4	2	8
	312	Training Room	1	300	300

400	Performing Arts			Subtotal	8385
		Space	Qty.	S.F.	Total S.F.
	401	Auditorium Seats	850	10	8500
	402	Lobby	1	1700	1700
	403	Stage	1	2250	2250
	404	Costume/Prop Room	1	200	200
	405	Make-up/Dressing Room	2	250	500
	406	Scene Shop/ Storage	1	500	500
	407	Sound and Light Control Room	1	200	200
	408	Storage, Chair/Piano	1	200	200
	409	Ticket Booth/Box Office	1	100	100
		General Music			
	410	Instrumental Practice Room (Large)	1	150	150
	411	Instrumental Storage	1	400	400
	412	Dance Studio	1	2000	2000
	413	Office	1	100	100

500	Media Center			Subtotal	6570
		Space	Qty.	S.F.	Total S.F.
		Library Commons			5400
	501	Individual Reading Area		3800	
	502	Computer Space		1300	
	503	Group Study Rooms		300	300
	504	Office for Instructor	1	120	120
	505	Equipment Storage	1	200	200
	506	Telecom Room	1	250	250
	507	Workroom	1	300	300

600	Visual Arts			Subtotal	7150
		Space	Qty.	S.F.	Total S.F.
	601	Art Commons/ Gallery	1	600	600
	602	3D Studio	1	1600	1600

	603	Kiln Room	1	200	200
	604	Multi-Purpose Studio	2	1400	2800
	605	Photography/ Graphic Arts Classroom	1	1400	1400
	606	Darkroom	1	150	150
	607	Storage	4	100	400
700	**Dining**			**Subtotal**	**10850**
		Space	Qty.	S.F.	Total S.F.
	701	Cafeteria	1	7000	7000
	702	Chair Storage	1	300	300
	703	Kitchen	1	1900	1900
	705	Serving Area	1	1000	1000
	707	W.C. / Locker Area	2	125	250

800	**Academic Support**			**Subtotal**	**2900**
		Space	Qty.	S.F.	Total S.F.
		School Community Support Suite			
	801	Coordinator Office	2	150	300
	802	Conference Room	1	300	300
	803	Activity Room	1	800	800
	804	Teacher Support Room	1	250	250
		Special Education Admin. Suite			
	806	Coordinator Office	2	150	300
	807	Conference Room	1	300	300
	808	Co-Teacher Suite	1	400	400
	809	Teacher Support Room	1	250	250

900	**Health**			**Subtotal**	**3830**
		Space	Qty.	S.F.	Total S.F.
	901	Student Health Suite			
	902	Reception/Waiting Area	1	250	250
	903	Cot Rooms	2	200	400
	904	Exam Rooms/ Treatment Area	1	140	140
	905	Office	1	200	200
	906	Storage	1	50	50
	907	Toilet	2	50	100
		Community Health Suite			

	908	Reception/Waiting Area	1	250	250
	909	Cot Rooms	2	200	400
	910	Exam Rooms/ Treatment Area	1	140	140
	911	Office	3	200	600
	912	Storage	1	50	50
	913	Toilet	2	50	100
		Health Clinic Space			
	914	Reception/Waiting Area	1	150	150
	915	Dental Suite	1	170	170
	916	Exam Rooms	3	80	240
	917	Lab/Charting Area	1	200	200
	918	Provider Offices	2	120	240
	919	Storage	2	50	100
	920	Toilet	1	50	50

1000	**Administration**			**Subtotal**	**4685**
		Space	Qty.	S.F.	Total S.F.
	1001	Lobby	1	900	900
	1002	Reception/Waiting Area	1	600	600
	1003	Principal's Office	1	230	230
	1004	Conference Room	1	300	300
	1005	Mail Room	1	200	200
	1006	Office	4	120	480
	1007	Security Center/ Office	1	300	300
	1008	Staff Break Room/Dining	1	400	400
	1009	Storage	1	75	75
	1010	Storage (Textbooks)	1	700	700
	1011	Telecom Room	1	250	250
	1012	W.C. (Adult)	1	50	50
	1013	Workroom	1	200	200
1100	**Guidance**			**Subtotal**	**3400**
		Space	Qty.	S.F.	Total S.F.
	1101	Reception	1	250	250
	1102	Career Center	1	500	500
	1103	Conference/Testing Room	1	250	250
	1104	Offices	8	150	1200
		Parent/Community Resource Center			

	1105	Reception	1	150	150
	1106	Office	2	150	300
	1107	Parent Resource Room	1	500	500
	1108	Storage	1	200	200
	1109	W.C. (Adult)	1	50	50

1200	**Building Support & Maintenance**			**Subtotal**	**52600**
		Space	Qty.	S.F.	Total S.F.
	1201	Circulation		50000	5000
	1202	Receiving	1	500	500
	1203	Building Supervisor Office	1	150	150
	1204	Custodial Workroom	1	350	350
	1205	Custodial Storage	3	150	450
	1206	Engineering Office	1	150	150
	1207	Engineering Storage	1	400	400
	1208	Outside Storage	1	300	300
	1209	W.C./ Shower/ Locker	2	150	300

5. Program Description

100	**Academic**			**Subtotals.f.**	**50650**

A. General description

Academic classrooms are used to teach CORE subjects, such as English, math, and social studies. The classroom should be well lit and acoustically suitable for small and large group learning. The furniture and the configuration of the room should be movable and flexible enough to accommodate any of the core classes. Design consideration should be given to various teaching styles and to current technology such as smart boards and computers. Some of the activities which will take place in academic classrooms are computerized instruction, hands-on activities, large and small group instruction, oral presentations, and team teaching.

B. General Relationship

The core classes should be locate near science lab and teacher center. If possible it should also be near ESL classrooms and community-education classrooms. The classrooms should be able to open up into larger meeting rooms to allow for large group activities. The classrooms should be located close to the street on the south portion of the site to maintain the street edge and to have a spatial connection with the neighborhood. Classrooms on the north side should have large windows in order to receive ample sunlight and take advantage of the view onto the field.

200	**ESL/Community**			**Subtotal**	**8950**

A. General Description

The ESL classrooms are focused on teaching English to students who are not fluent. Similar to academic classrooms, the ESL classroom should be well-lit and acoustically insulated from outdoor noises. However, the ESL classrooms are smaller, because it does not carry the same requirement of accommodating for all CORE classes. Even so, the furniture should be flexible and accommodate large group work as well as individual instruction.

The community-use classrooms would be larger than the ESL classrooms as the intended uses vary widely. The classroom should be well-lit and acoustically insulated from outdoor noises. Permanent fixtures include large storage units to store the tools and equipment for activities that the community contributed.

Blended learning lab would contain 15-20 computers with headphones. The need for flexibility is minimal as this room is mainly reserved for the use of computers. In addition to chairs and table for students, the instructor should have

his/her separate table, chair, and computer. There should also be projection screen, an overhead projector, and white board.

B. General Relationship

One of the blended learning labs should be located between two ESL classes, and the remaining one should be located between an ESL classroom and classroom for general community. The connection of the learning labs to the bordering classrooms should be reinforced by the use of a half-wall. All three spaces should be connected to academic support spaces as the instructors and students can use the resources from the space.

300	**Physical Education**			**Subtotal**	**22758**

A. General Description

The gymnasium serves as a facility to educate students on physical education during the school hours and for practice by student sport teams' after-school hours. During the weekends or when the facility is not used by sport teams, the main gymnasium should be able to be used by the community. There should be adequate number on seats on the bleachers to host competitions and community programs. The bleachers should be retractable so that more room is available for physical education classes.

Fitness and weight room should contain several exercise equipment for cardio and weight-lifting. The capacity of this space should be around 28 students. Multipurpose room and wrestling room should have resilient athletic flooring and should be cleared of any furniture. Similar to the gym, the community should be able to use these spaces.

The locker rooms should have 300 lockers for each area (boy's and girl's). There should be toilets, sinks, and shower stalls. Adequate room should be given between lockers for students to change. As humidity is one of the main factors in this space, there should be adequate ventilation system, humidity/temperature controls, and cleanable wall surfaces.

B. General Relationship

The main gymnasium should be located near outdoor athletic fields to the east of the site and near a parking lot. Auxiliary spaces—locker rooms, department offices, storage, and laundry—should also be located nearby. Fitness and multi-purpose room should be adjacent to each other and near lockers as well. As fitness room and multi-purpose room should be available to the public during non-school days, there should be considerations for isolating these spaces from the rest of the school.

400	**Performing Arts**			**Subtotal**	**8385**

A. General Description

The main goal of the auditorium is to provide a venue for school performances and possible gathering space for school wide meetings. In addition, it should also be able to host community events. Acoustics is a major component of this space. Thus, sound panels should be used on the ceiling and wall to reduce noise reverberation. Seats should be arranged so that all has a clear view of the stage.

The back of the house spaces include costume/prep room, dressing room, and scene shop. The stage would be have wood-flooring and should have enough room to accommodate dance and music performances. The scene shop should have a

minimum of 20 feet ceiling height to accommodate large set pieces and the door should be 15 feet high and 10 feet wide. The shop should be large enough to accommodate for cutting wood, painting, and other production of props. It should also have adequate ventilation to deal with the paint.

B. General Relationship

All spaces related to the performing arts should have easy access to the rest of the school, but should also have the capability to be closed off from the rest of the school. This would give it potential to be used on during-school and off-school hours. The space should be located next to or near visitor parking to accommodate for community use. It should also have access to public bathrooms and also feature a lobby.

500	**Media Center**			**Subtotal**	**6570**

A. General Description

One of the main objectives of the media center is to provide students, staff, and community with access to books and digital information. Another objective is to provide spaces for social interactions, presentations, and for multi-media production. Some of the rooms which need to be included are storage space for books, meeting rooms for small and large groups, and offices for the staff. In addition, this space should have natural sunlight, although careful measures should be taken to reduce glare.

Furniture play an important role in the configuration of the space. Bookcases should be arranged so that it does not obstruct the views to the window. In addition, there should be a mix of lounging chairs, work chairs, and tables. There should also

be a space designated for computer stations, where approximately 30 computers would be provided.

B. General Relationship

Media center should be located at or near the center of the school. It should have easy access to the academic classrooms and bathrooms. It should be in the line of vision from the primary entrance so that it is seen as a welcoming space. Information/check-out desk should be located next to the media center entrance and the staff offices.

700	**Dining**			**Subtotal**	**10850**

A. General Description

Dining area should be filled with natural light and provide large enough space for students to sit down and to move round. Ideally, the dining would serve as the heart of the school where students and teacher can come to work or socialize throughout the day. There would be a clear view towards the athletic fields and there would be operable windows to allow for natural ventilation.

B. General Relationship

Dining area should be located adjacent to food preparation area to allow for a smooth and effective flow during breakfast and lunch hours. It should have access to large storage area so that the dining tables and chairs can be removed for community events such as voting. It would be located towards the northern side of the school in order to be close to the athletic fields.

900	**Health**			**Subtotal**	**3830**

A. General Description

Two sets of health suites are included in the program for the students and the community because lack of health insurance is one of the major problems of Prince George's County. The school has an opportunity to provide the community basic care and to provide filing help with obtaining necessary insurance. Aside from the fact that community health suite have more offices, the two suites have the same programmable area. The health suites should have a waiting area that could accommodate six people. The cot rooms, which provides a space to rest, should have two to three cots per area which are separated by blinds. Examination room should have adequate space to accommodate activities such as health screening, administrative paperwork, and medical treatments. All spaces mentioned above shove have enough room to accommodate for wheelchair movement.

B. General Relationship

As all the health-related spaces must be wheelchair accessible, they should be located on the ground floor at an easy access to from entrance or the parking lot. The health spaces are one of the main ways of reaching out to the community so they should be centrally located within the school. The cot rooms should be located in areas visible to the office and waiting room. The office and the examination rooms should be adjacent to provide better work flow.

1100	**Guidance**			**Subtotal**	**3400**

A. General Description

Guidance center will play a central role in reinforcing a sense of community within the school and to alleviate stress among student body by providing counseling services. There should a reception area and offices which would serve individual counselors. There should also be large conference rooms to accommodate teambuilding exercising or career workshops, which can strengthen the student's self-esteem and his/her sense of place within the school. There should also be smaller conference/exam rooms, where a large table with several chairs are located with a whiteboard.

B. General Relationship

Guidance offices should be located close to academic support center. Ideally, it would be located close to the academic classrooms. It should be wheel chair accessible.

Thesis Design

Plans and Sections

Figure 79: Civic points of interest in the surrounding neighborhood
Map by May Sein Win

Figure 80: Site map and the first floor plan
Drawing by May Sein Win

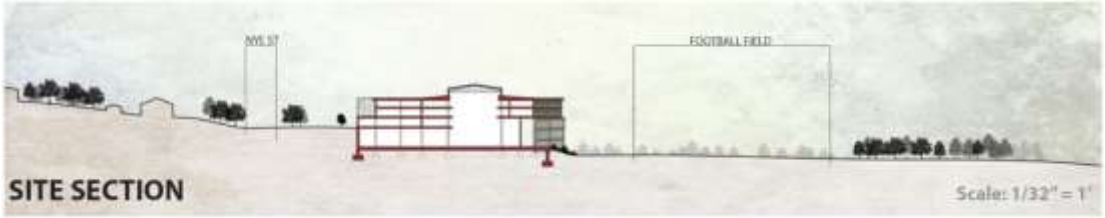


Figure 81: Site section showing the level difference
Drawing by May Sein Win

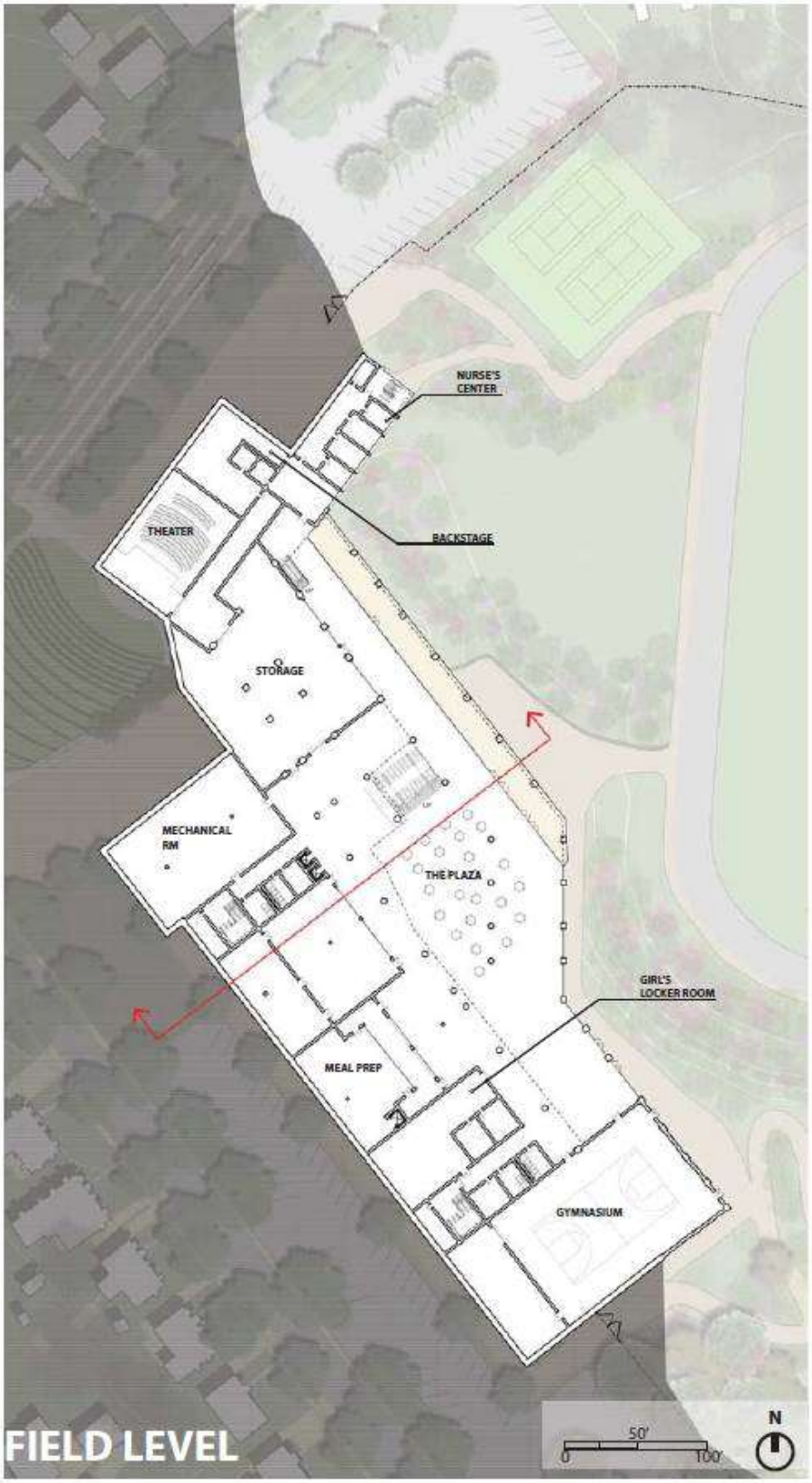


Figure 82: Plan of the field level
Plan by May Sein Win

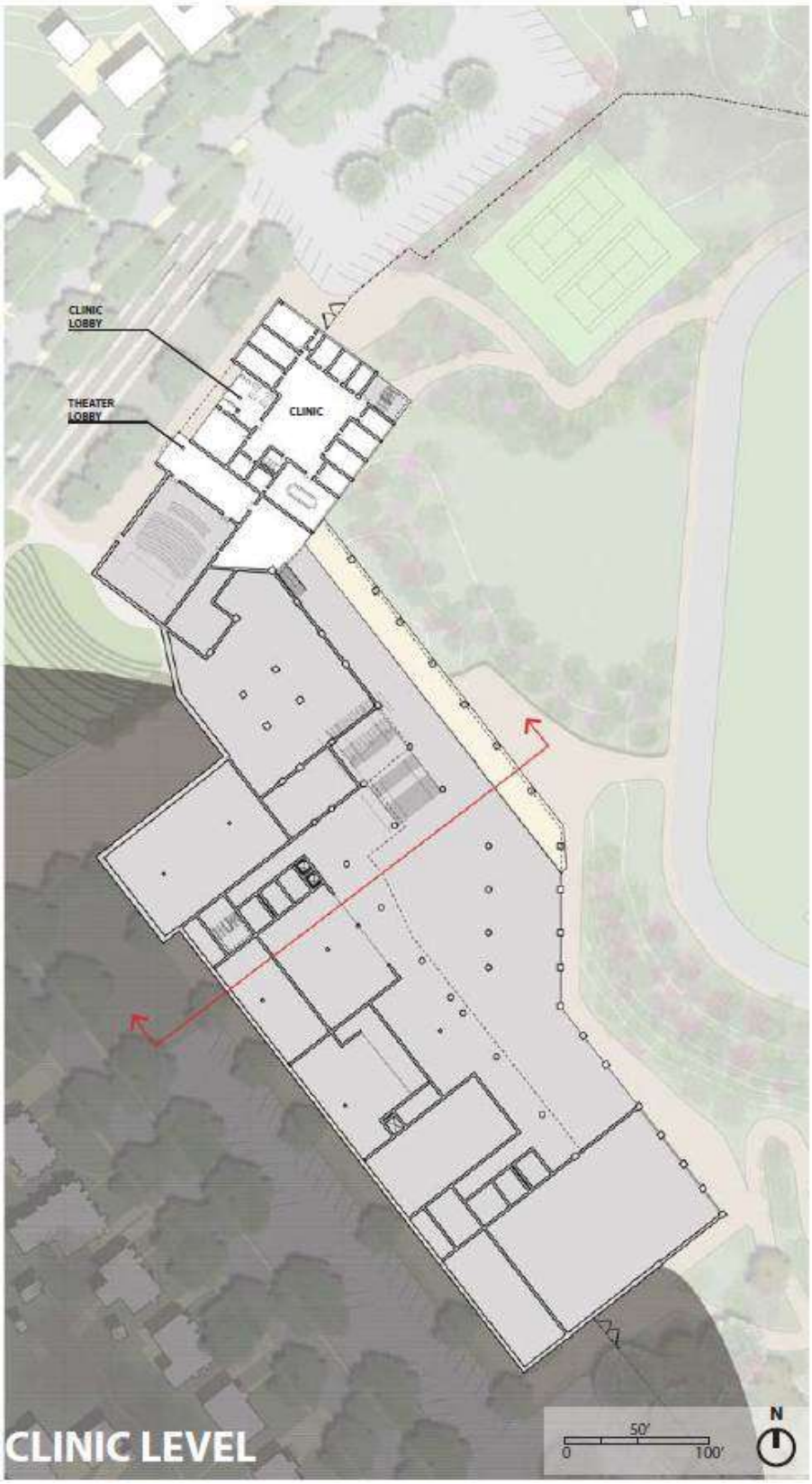


Figure 83: Plan of the clinic level
Plan by May Sein Win

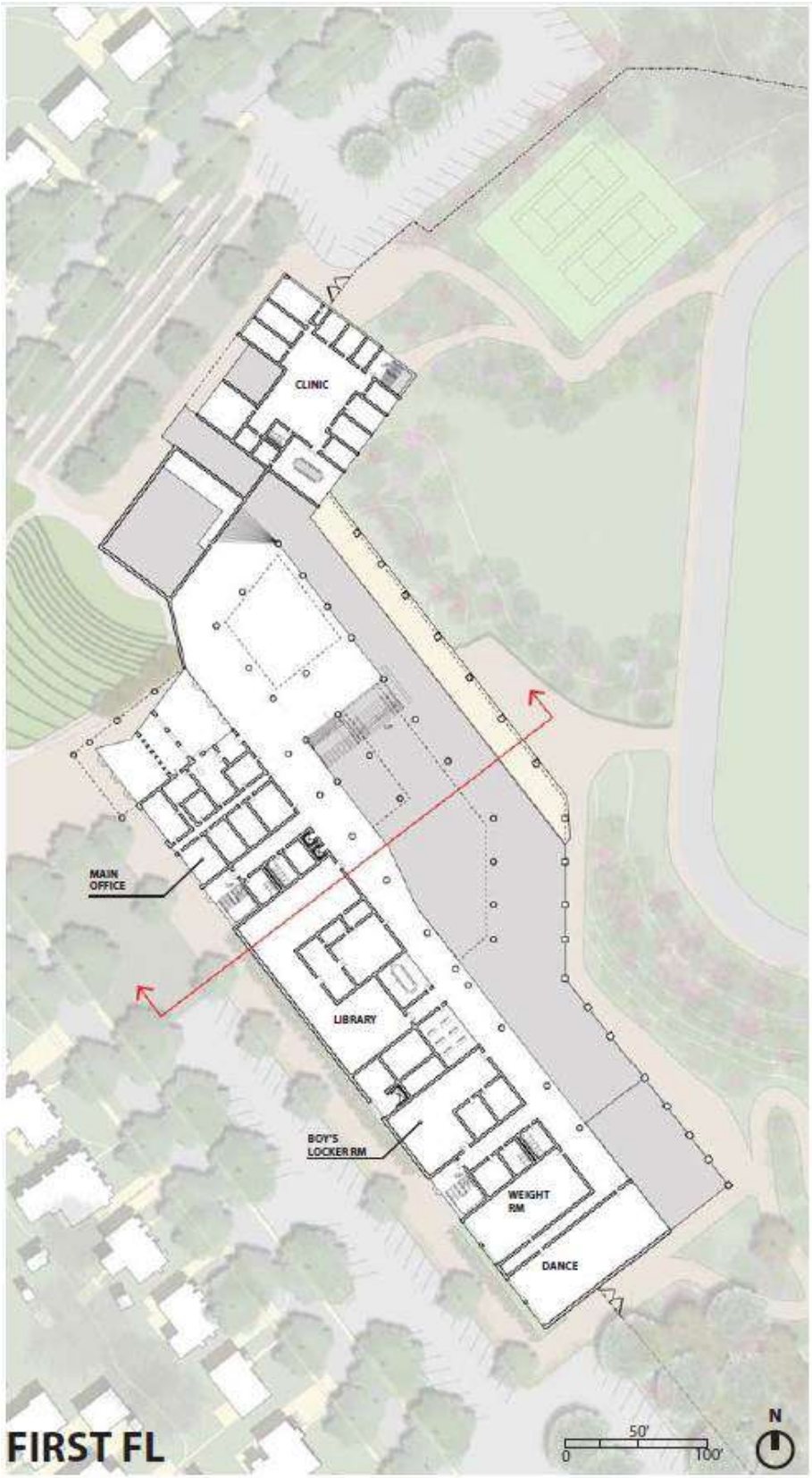


Figure 84: Plan of the first floor
Plan by May Sein Win

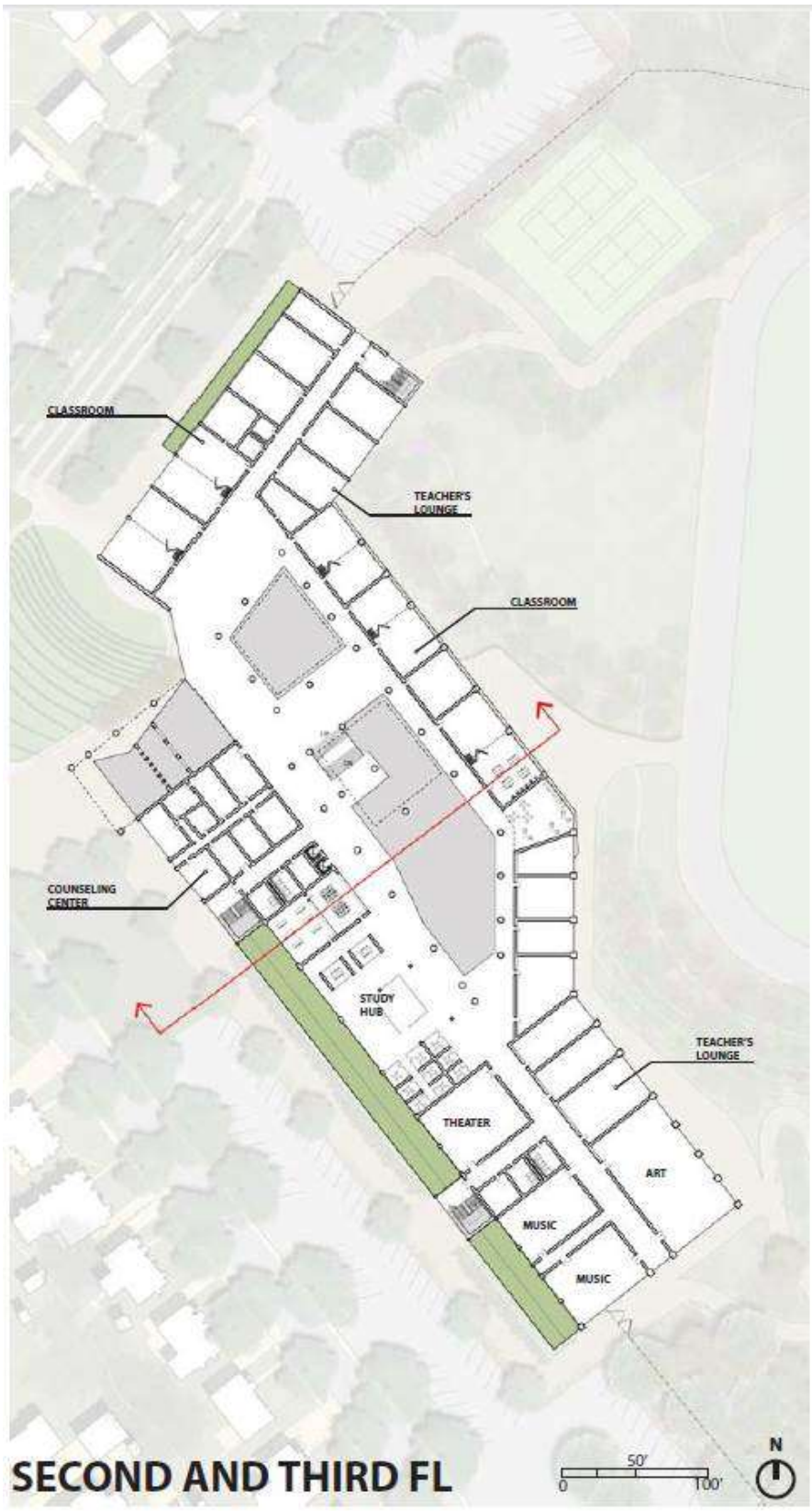


Figure 85: Plan of the second and third floor
Plan by May Sein Win

Community

This thesis aims establish a mutually beneficial relationship between the school and the community by establishing a sense of investment from the community in the school. One main strategy is to provide a much-needed healthcare service by establishing a two-story clinic that would serve as the basic care provider for those without insurance in the community. Incorporation of the clinic means that a school can serve beyond the basic Prince George's County Public Schools (PGCPS) guideline of providing space within the school for community events. It can establish and strengthen the perception of school as an integral and much-needed institution for the whole community that extends beyond its teaching responsibilities. This means the school can serve those in the community that otherwise would have overlooked the school as another one of the institution that he/she has no part in. The clinic will expand the demographic of people within the community who are served by and are invested in the school.

Another strategy is to open up the special program within the schools which can be used during the school hours and off-school hours. Generally, in cases where the special program areas within the school allow for community use, the hours of use by the community are limited to off-school hours when the students are not present on the school premises. This thesis reexamines this strategy and brought another design which would allow the use of some spaces within the school by the community even during school hours.

The first step to doing this is to analyze the frequency of use by the students for the special program spaces: theater, cafeteria, and gymnasium. The theater stood out as a space which is sparsely utilized by students throughout a normal school-day, and so offers the highest potential to be opened up to public use throughout the school day.

The entry points became the barrier and an opportunity in opening up the use of the clinic and the theater. One major reason which discourage the use of school spaces by the community is the security concern of the students and community mixing together within the school. This thesis solved this by grouping the clinic and the theater (school-hour community-use spaces) to the north wing of the school and providing separate entrances to these spaces to be used by the community [Figure 86].

This thesis aims to also establish pleasant outdoor spaces for community use within the school property [Figure 87]. Specifically, there would be a large amphitheater that is located near the intersection of the nearest bus stop and a small plaza adjacent to the clinic. These two distinctive spaces of difference scales provides spaces of interaction and relaxation that allows for a wide variety of use. The addition of public outdoor spaces expand the influence of the school to beyond those who are served by the clinic and the theater, which further strengthen the sense of investment within the school.

The amphitheater is designed to be flexible by the establishment of a blank wall of the north side and a stage. The blank wall, to which the seats of the amphitheater face, serves as an excellent screen for projection that allows the space to be use at night [Figure 88]. This can spur community-building events such as kid's

movie night that allows for children to be familiar with the high school long before they attend there. The stage allows for spontaneous and planned events to take place in the amphitheater such as a play or impromptu class on a sunny day.

The plaza adjacent to the clinic is a smaller, shaded place that provides open leveled area as well as benches [Figure 89]. The open area can serve as a space for food carts or outdoor market stands. This allows for events such as Food Cart Thursdays to take place which would help local venders and entrepreneurs gain customers within the community. The benches would support this activity by providing seated areas for the customers to enjoy their food. It could also serve as a place to rest for joggers around the neighborhood.

Jacobs maintains that a street with more usage make a safer and more lively community. As such, the thesis design seek to encourage pedestrian use through the use of streetscape, especially to and from the public transportation stops. Due to the limited space in front of the single family homes in this dense neighborhood, the thesis employs minimal but effective use of trees to provide shading [Figure 90]. The design intervention is focused along Nye Street, Addison Road, and North Englewood Drive which are the routes that pedestrians would take from Sherwood Metro and the nearest bus stops.

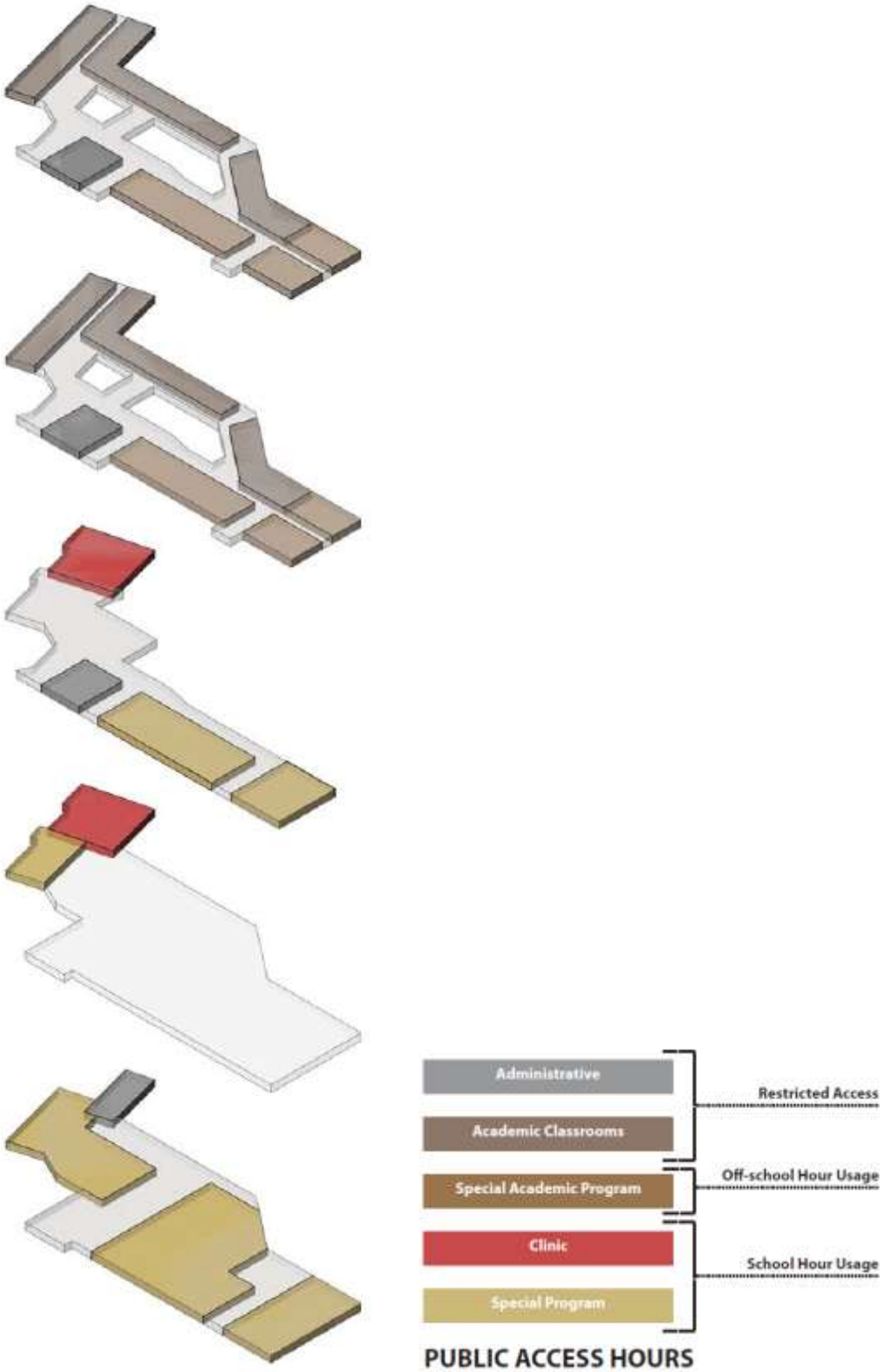


Figure 86: Diagram of program for the school and the public usage hours
Diagram by May Sein Win

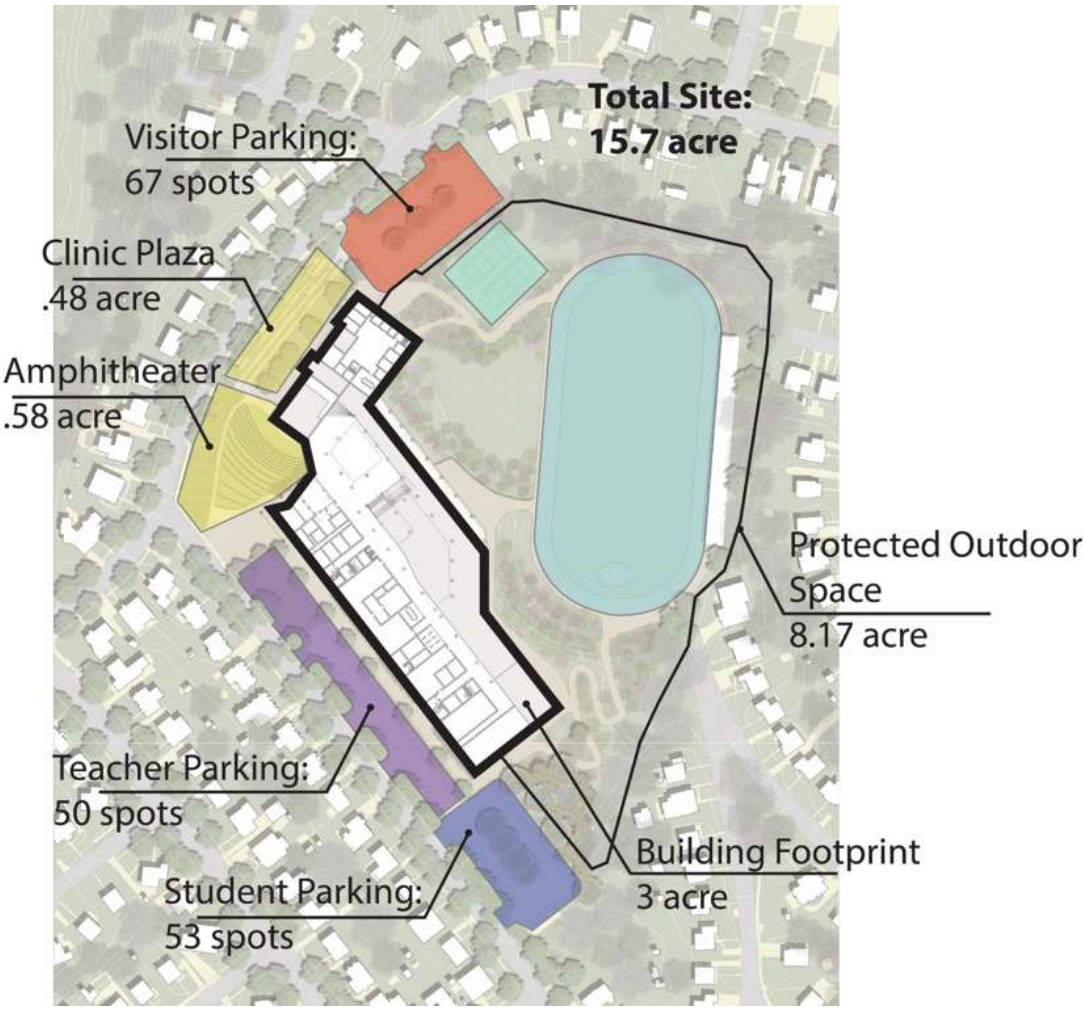


Figure 87: Outdoor spaces for the community
Diagram by May Sein Win

KID'S MOVIE NIGHT AT FAIRMONT

Figure 88: Rendering of the amphitheater and a possible use which brings together the community
Rendering by May Sein Win

FOOD TRUCK THURSDAYS IN FRONT OF THE CLINIC

Figure 89: Rendering of small plaza in front of the clinic and a possible use
Rendering by May Sein Win

Figure 90: Rendering of site and the green pathways which promotes walkability
Rendering by May Sein Win

Safety

The thesis site design balances the seemingly opposing objectives of creating a welcoming presence in the community while still maintaining a high level of security. This requires a myriad of strategies, ranging from the use of warm and inviting materials to clerestory windows. Given that the site was chosen due to high crime rate, the design needs to use several reinforcing strategies to deter criminal or harmful activities outside and inside the school. This thesis maintains the stance that achieving this does not have to result in the school which closes itself from the community.

The property of the school is conceptualized into two portions which are divided by the school: one which faces the street and the houses along it (Street Side) and the large field which faces the back of the homes (Field Side). The Street Side provides gathering spaces for the community (amphitheater and a small plaza) along

with parking for the visitors and the school [Figure 91]. This side is left open without fencing to create a welcoming effect. The Field Side is fenced to deter intruders from entering the exterior sport facilities [Figure 92]. Street lights are placed on the Street Side which will be on throughout the night and motion-activated light on the Fence Side, reinforced by security cameras, to discourage trespassing during the night [Figure 92].

Clerestory windows are used on the ground floor on the Street Side façade to deter possible intruders from breaking in [Figure 94]. The wall of the ground floor is clad in wood to provide warmth and texture to those walking alongside it. Second floor and third floor have floor to ceiling windows which extend from column to column, so that as a whole the street façade still looks open. The south-facing windows are clad with thin wooden louvers which are operable by each classroom to protect against the harsh sun rays during summer and to allow for privacy if desired.

Clear vehicular and pedestrian separation prevents possible accidents and protect the safety of the pedestrians [Figure 91]. This thesis design has a designated area for school buses to drop-off and pick-up located closest to the school entrance, which allows the students to entering the school without having to share a path with cars. The bus area will be mostly grass with light paving made possible by the fact that it will only be used by vehicles for less than two hours per day. The student and teacher parking is separated from visitor parking (for school-hours) based on the distance each group need to travel for their respective entrances. Both parking spaces will have pervious paving to allow for greater drainage.

The core of the thesis strategy when addressing hotspots is the concept of visibility and transparency. The hotspots are defined as places where bullying is most likely to occur because they are traditionally places with no or little adult supervision (presence) and no clear line of visibility to the three main areas (stairs, hallways, and bathrooms). As the lack visibility is one of the main reasons why bullying is more likely to occur in these areas and go unnoticed, this design aims to increase visibility of the hotspots by the use of a large atrium and bringing the fire stairs case out towards the façade.

Opening the center of the school and placing the hallways around the void allows the students and the teacher to have a clear line of sight to the hallways on different levels [Figure 95]. This increases the sense of teacher presence that would deter acts of bullying. In addition, wider hallways gives the students the space to rest and people watch across the hallways. In a sense, student are encouraged to play a part in improving the safety of the school due to the transparent nature of the space [Figure 96].

Traditional 20th century schools have small, cramped fire staircases that are not apparent from the exterior or the interior, which often allows acts of bullying to go undetected. This thesis design brings all three fire staircases out towards the façade which faces the street side [Figure 97]. The stairwells are glazed on the exterior and two of the staircases along Nye Street are rendered as extruded volumes to increase their presence and visibility on the façade. The fire well's transparency and presence allows the residents of the homes and the pedestrians along Nye Street to partake in

ensuring the safety of the students. The interior walls to the fire staircases also will be glazed so the teachers and students in the hallways have a clear line of sight.

This thesis saw preventing bullying in bathrooms as a complex case that cannot be solved simply by increasing visibility into the space as it would sacrifice the privacy of the students. However, the concept of visibility is applied indirectly by locating bathrooms between stairwells and hallways to maximize the presence of foot traffic. Jane Jacob's concept of high pedestrian use result in safer neighborhood is applied here where the passing students and teachers can potentially hear the commotion or notice warning signs of students who suffered bullying in the bathrooms. The bathrooms and the fire staircases are grouped in a way that only one surveillance camera is needed to monitor each set of bathrooms and fire staircases.

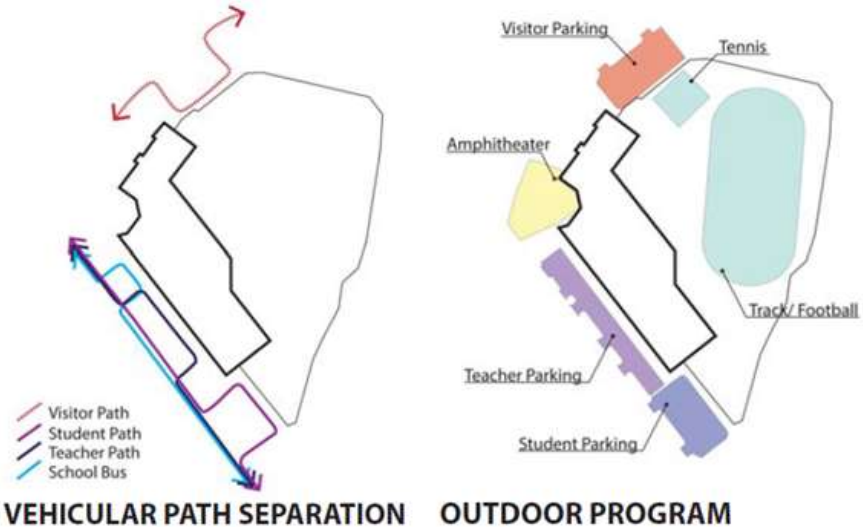


Figure 91: Diagrams of vehicular separation and outdoor program
Diagram by May Sein Win

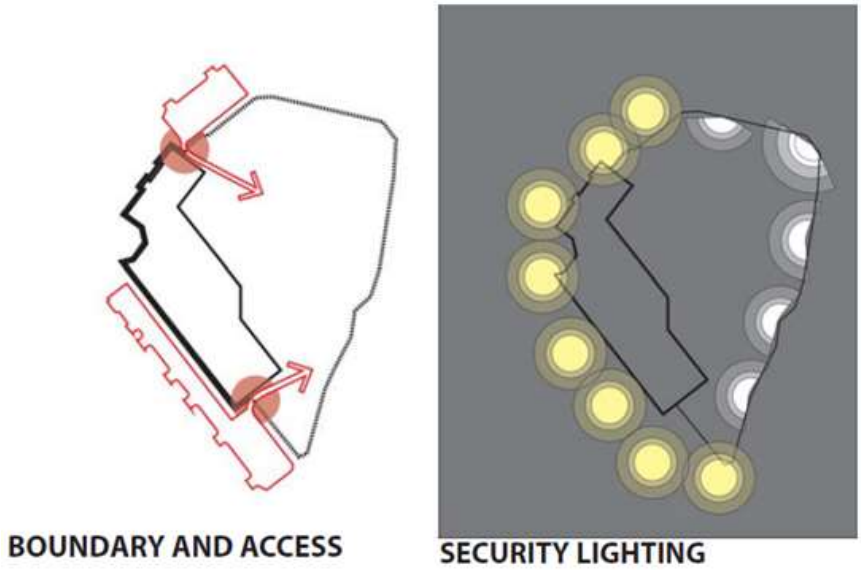
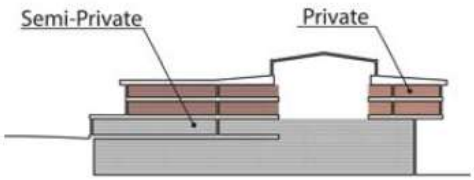
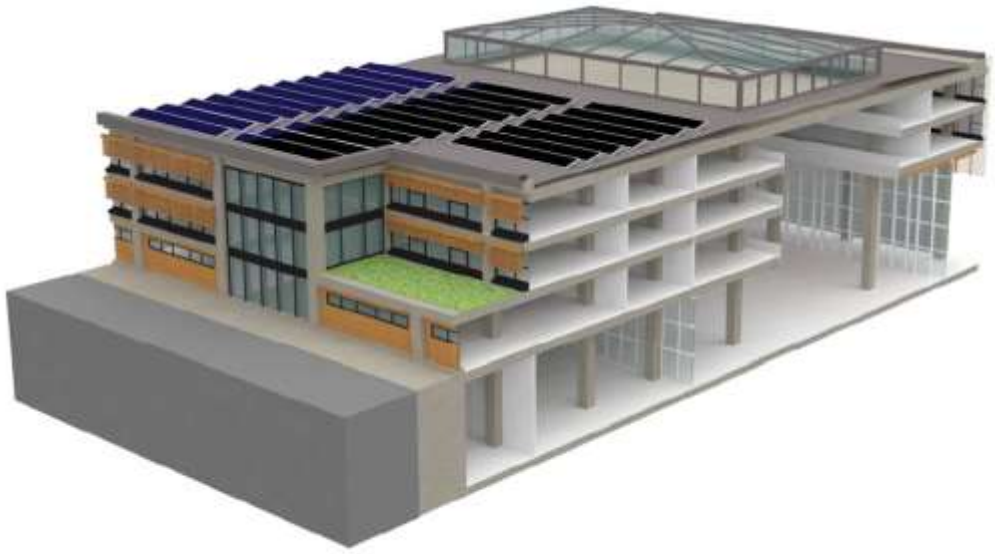


Figure 92: Diagrams of site boundary access and security lighting
Diagram by May Sein Win



DIVISION OF USAGE

Figure 93: Diagram of division of usage in section
Diagram by May Sein Win



CLERESTORY WINDOWS DISCOURAGE INTRUDERS

Figure 94: Section model
Drawing by May Sein Win

exterior and interior views of hotspots

Figure 95: Interior and exterior views to the hotspots and field
Diagram by May Sein Win

HALLWAY VISIBILITY

Figure 96: Rendering of hotspot (hallways and stairs) visibility and their light-filled experience
Rendering by May Sein Win

NEIGHBORHOOD VIEW TO STAIRCASE

Figure 97: Rendering of the view to the staircase, which prevents possible acts of bullying by increasing visibility
Rendering by May Sein Win

ENTRY HALL

Figure 98: Rendering of the entry experience filled with nature and artwork
Rendering by May Sein Win

Reduce Stress

This thesis takes the position that stress is a major contributing factor in cases where the students commit acts of violence. Furthermore, the thesis maintains that reducing stress is integral to allowing students to learn to their full potential in school. Traditional 20th century schools are designed based on strict schedule where students are expected to spend their time classroom to classrooms with little or no respite. The thesis design challenge this concept and asserts that students should have spaces and time for socializing and relaxing throughout the school day. In addition, the thesis challenges the traditional layout of the classroom which is configured in a lecture format where all the students' desks are facing the teacher. New classroom are designed to be more flexible to give the students and teachers a greater sense of involvement.

As the thesis aims to strengthen a sense of community for the neighborhood, it also aims to strengthen the sense of community within the school. In order to do that, places of interaction on different scales within the school. The "Plaza", which is a three story-tall space that looks out onto the athletic field, is the largest place of gathering [Figure 99]. Food service space is located adjacent to the space, which allows the Plaza to serve as a cafeteria. There is full glazing on the north side with three sets of double which leads out onto a covered outdoor eating area. One of the best method of reducing stress is through contact with nature; the use of skylight along with ample glazing and outdoor eating area in the thesis design blurs the barrier between the outdoor and indoor to create a stress-reducing environment [Figure 100].

The Hubs are smaller-scaled spaces (one locate on each floor) that can be used for both interactive and individual reflection purposes [Figure 102]. The low ceiling, warm lighting, wooden louvers, and soft chairs makes it a much more intimate and cozy space than the rest of the school. It provides a respite for the students from the daily rush of school and provides them with a space where they can be introspective or catch up with small group of friends. The space is divided into two components. One component have groups of high table with chairs and large monitor that the students can use. Pendent lights shine on each tables to reinforce the interactive nature of the space. The other half of the Hub consists of sofas which promotes a sense of relaxation on its user.

One of the greatest causes of stress in traditional schools is their failure to address and accommodate different types of learning styles. The classrooms are usually filled with student's desks and tables that are meant to be fixed in a position directed to the front of the classroom. The students have little choice but to listen to the teacher's lecture, work individually, work as a group, etc. in the same configuration. The thesis design proposes that the classroom should allow for flexible layout to accommodate different types of classroom activities and learning styles. Research states that "matching the environment to the requirements of the person (child) through moving items in the environment and by moving themselves to minimize discomfort and enhance comfort and performance."[99] Therefore, the Fairmont thesis design uses movable furniture in classrooms to encourage a sense of ownership and investment among the teachers and the students [Figure 103].

[99] Smith TJ. "The ergonomics of learning: educational design and learning performance." 1531

Retractable walls are another design method used to allow for more flexible configuration of the classrooms. They are employed between two sets of classrooms so that a larger room can be formed for inter-class activities. It is important to recognize that both group activities and individual research are necessary components of learning. Thus, computer monitors are set up on tables along the non-retractable walls, an area reinforced with hanging lights, to allow for a more individualistic academic pursuit.

Figure 99: Rendering of the plaza which provides the main space for interaction with generous glazing to allow view to the field outside

Figure 100: Natural sunlight through large windows and skylight
Diagram by May Sein Win

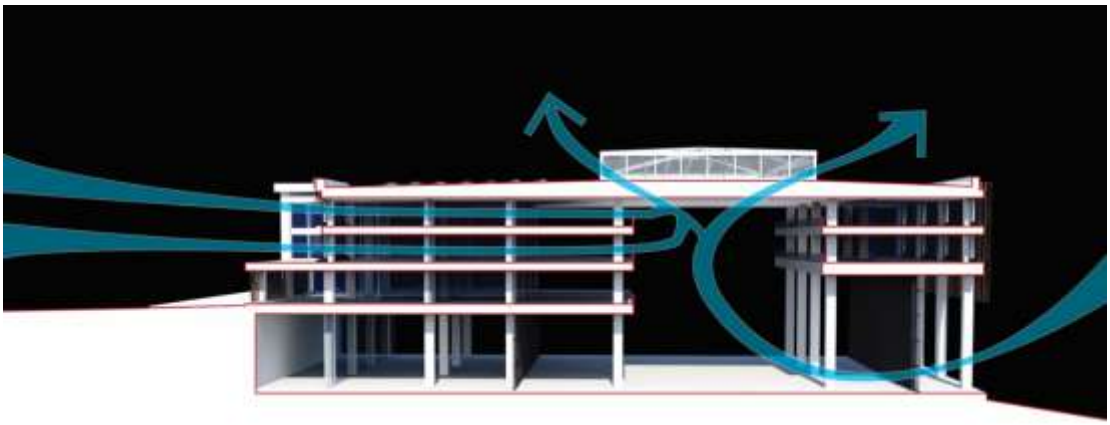


Figure 101: Natural ventilation through school
Diagram by May Sein Win

THE HUB: PLACE OF RELAXATION

Figure 102: Rendering of a smaller gathering space which also provides space to retreat and reflect

FLEXIBLE CLASSROOM LAYOUT

Figure 103: Rendering of the classroom layout showing multiple usage which caters to different learning types

Appendices

Regional Study

Figure / Ground

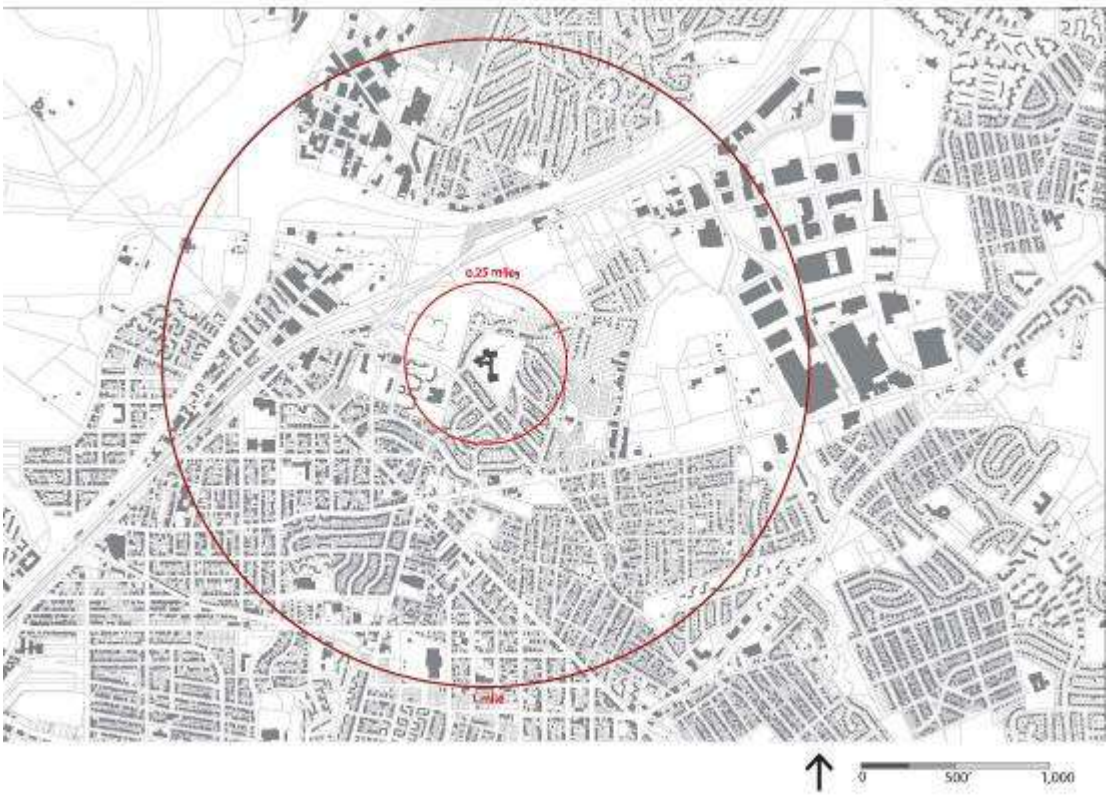


Figure 104: Figure/ Ground map of the region surrounding Fairmont Heights High School. Map generated by May Sein Win using ArcMap GIS

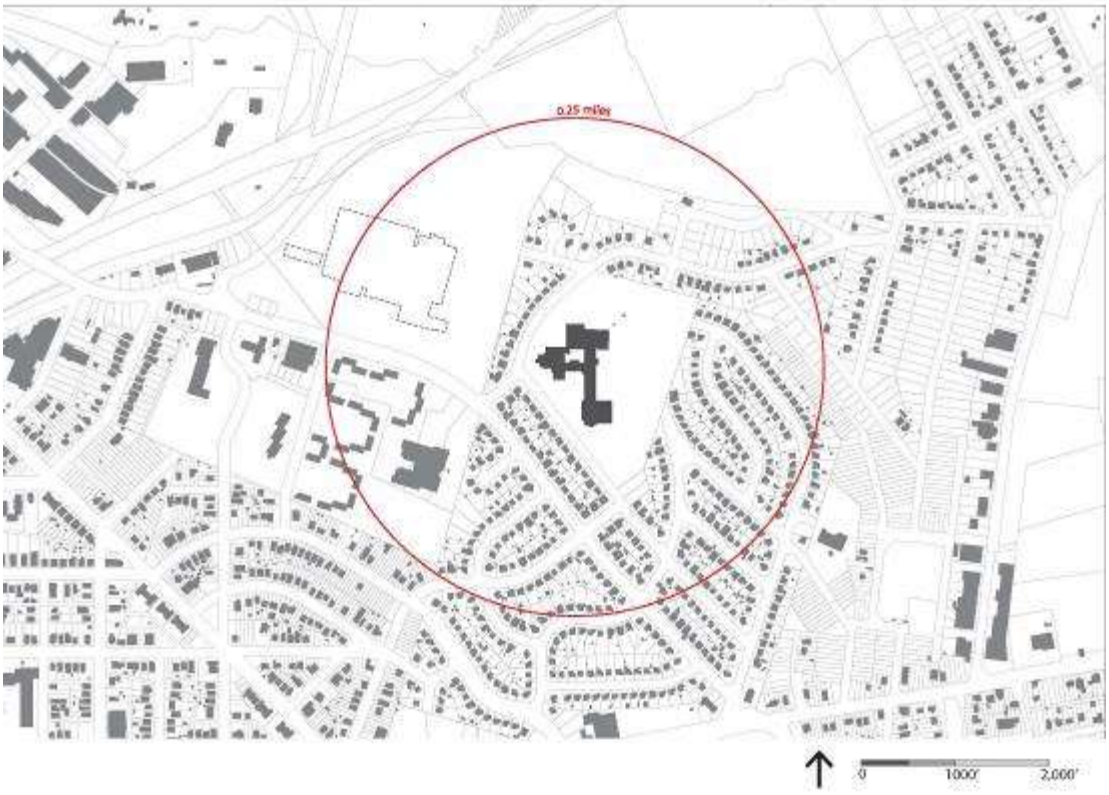


Figure 105: Figure/ Ground map of the neighborhood surrounding Fairmont Heights High School.
Map generated by May Sein Win using ArcMap GIS

Topography

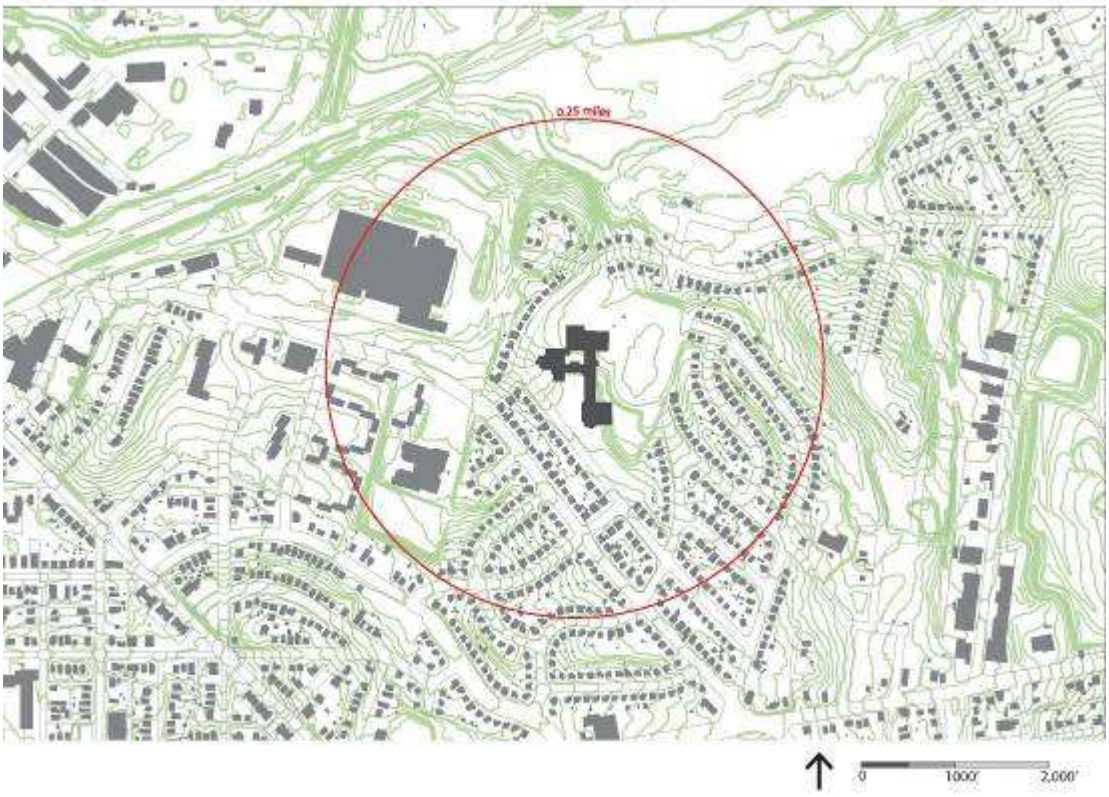


Figure 106: Topography map of the neighborhood surrounding Fairmont Heights High School. Map generated by May Sein Win using ArcMap GIS

Tree Canopy

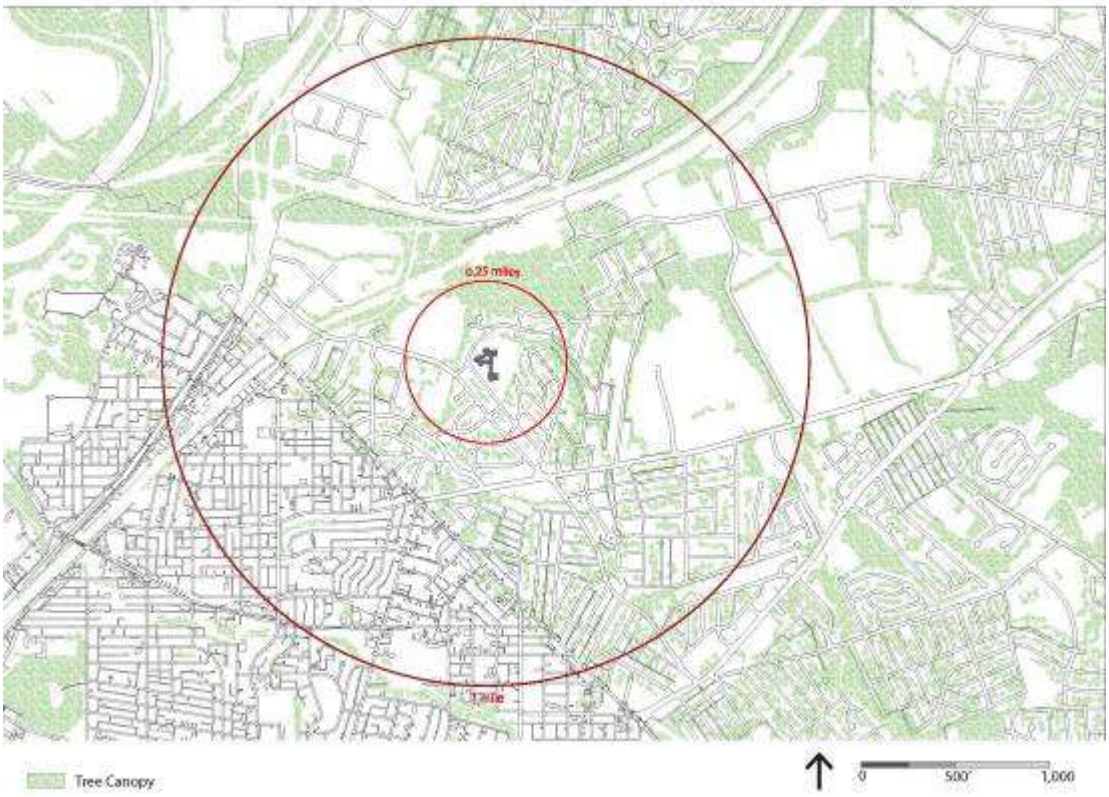


Figure 107: Map of tree canopies in the region surrounding Fairmont Heights High School. Map generated by May Sein Win using ArcMap GIS

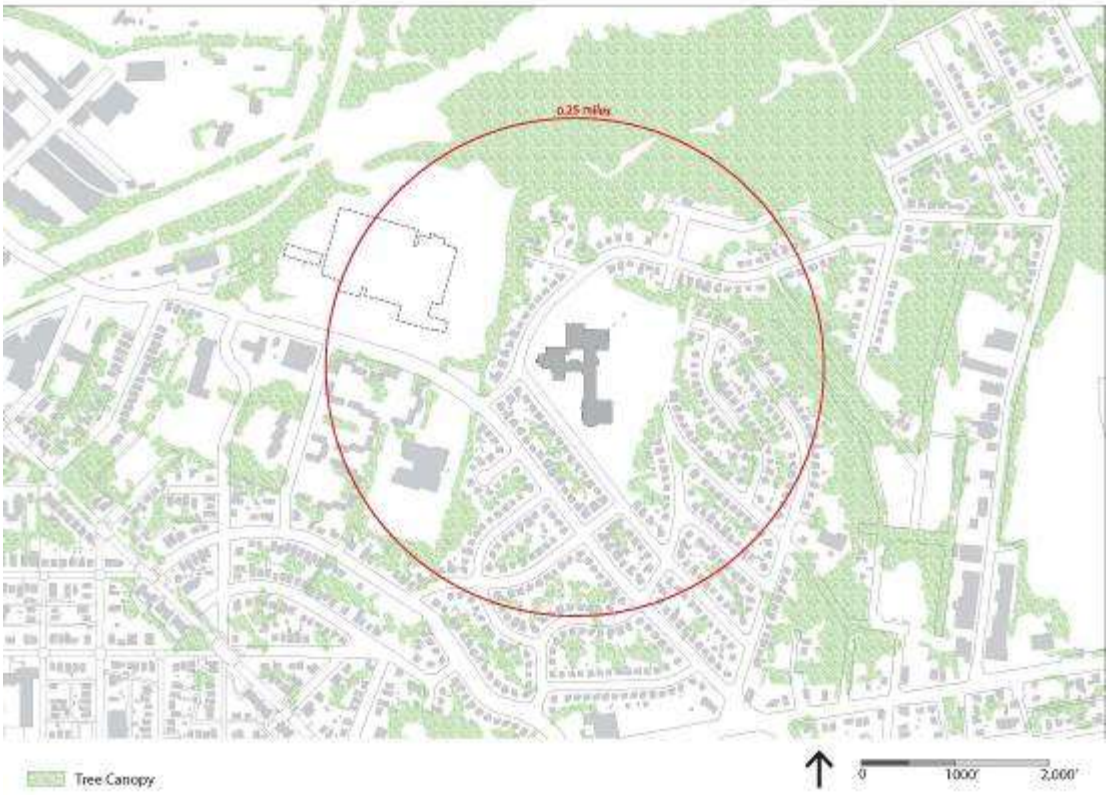


Figure 108 Map of tree canopies in the neighborhood surrounding Fairmont Heights High School. Map generated by May Sein Win using ArcMap GIS

Impervious Surfaces

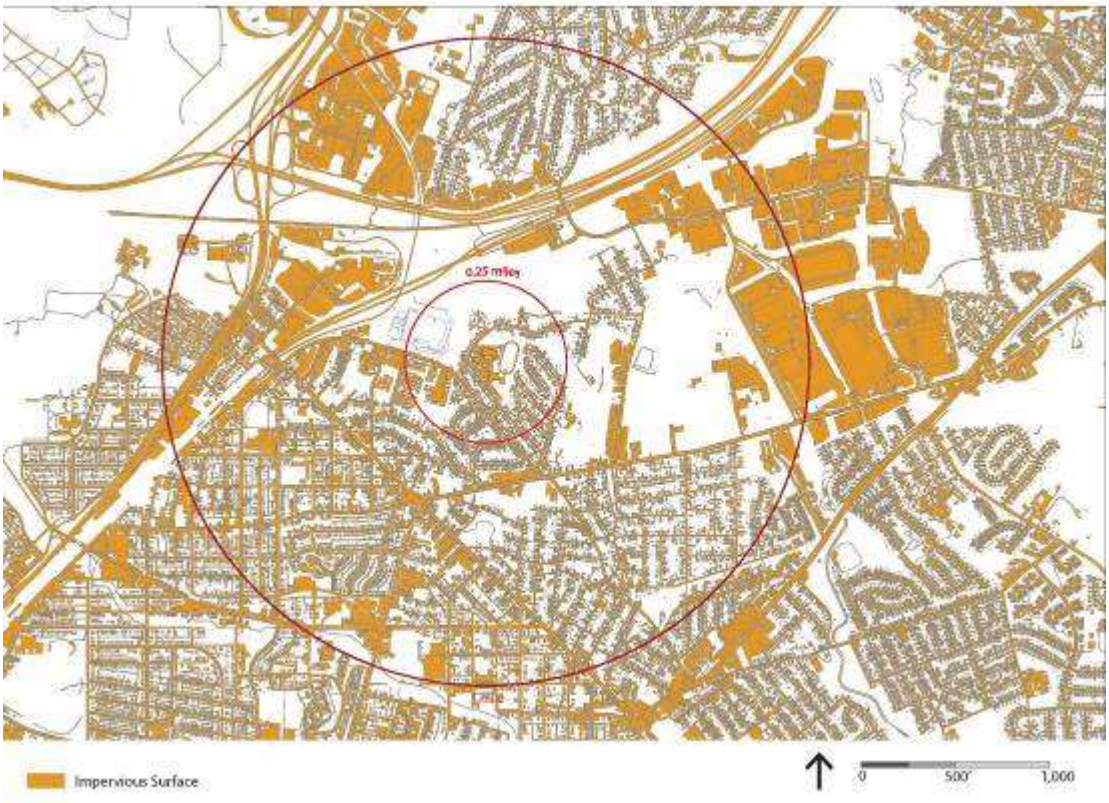


Figure 109: Map of impervious surfaces in the region surrounding Fairmont Heights High School. Map generated by May Sein Win using ArcMap GIS

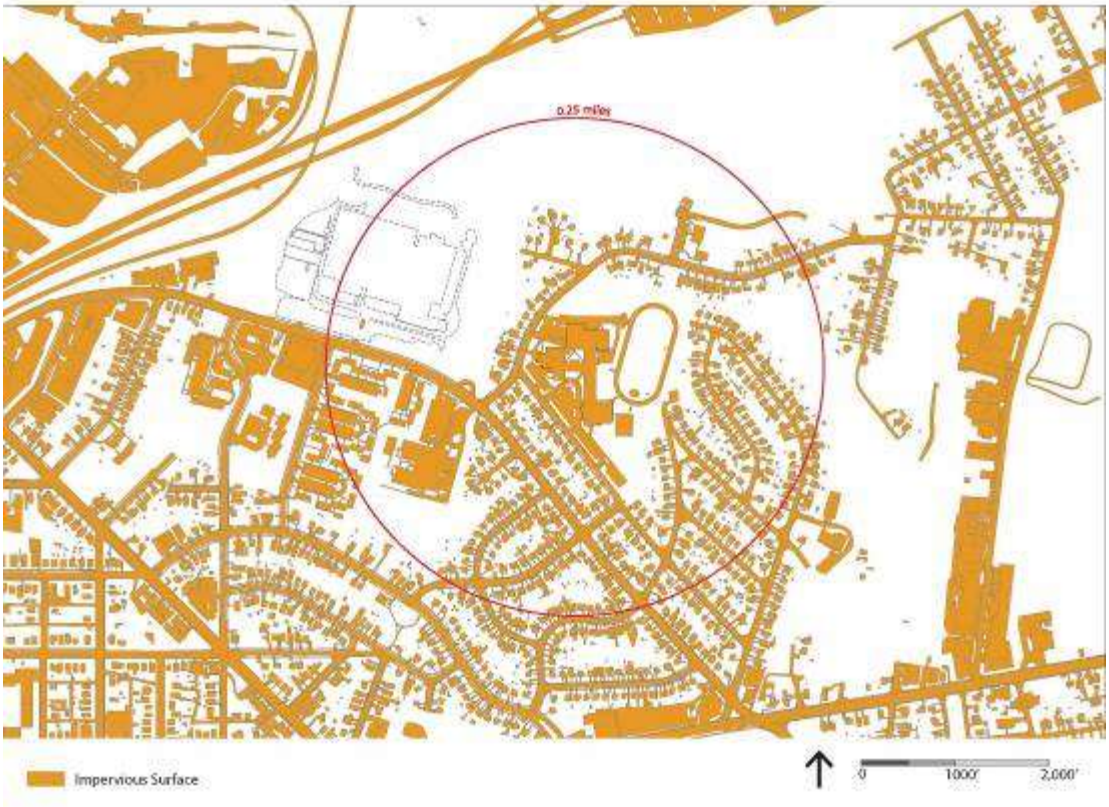


Figure 110: Map of impervious surfaces in the neighborhood surrounding Fairmont Heights High School.
Map generated by May Sein Win using ArcMap GIS

Building Configuration: Precedent Studies

New Fairmont Heights High School

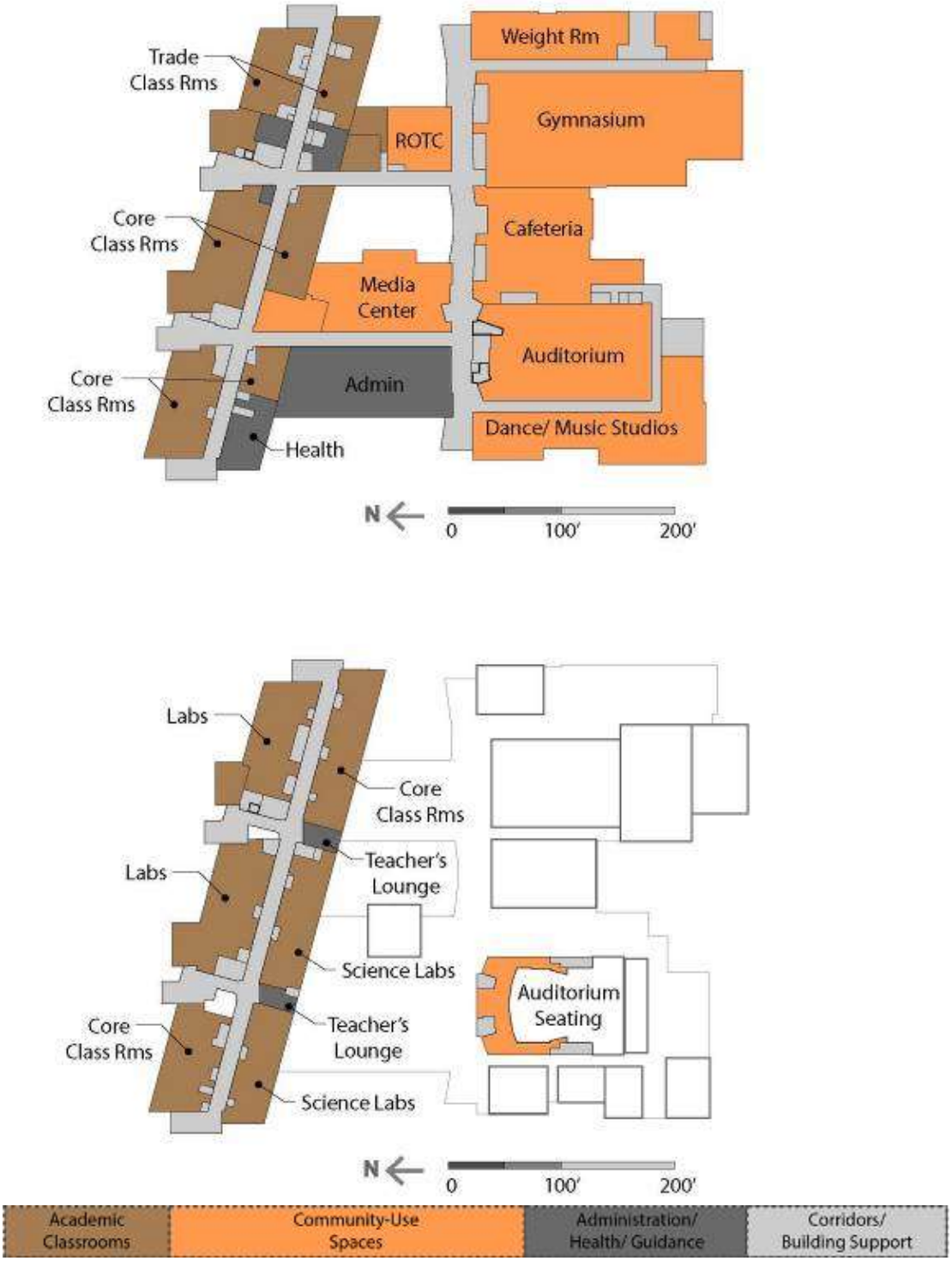


Figure 111: Program analysis of New Fairmont Heights High School Diagram by May Sein Win

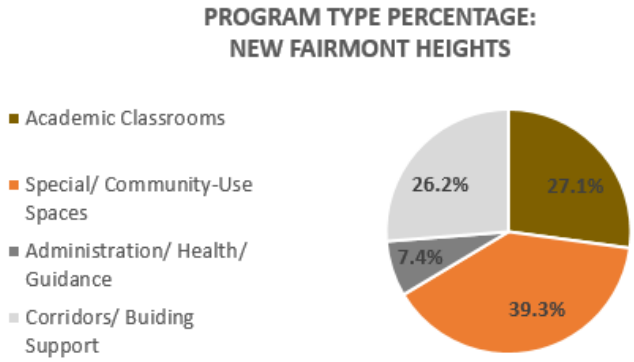


Figure 112: Percentage comparison of program types based on area, New Fairmont Heights High School
Chart by May Sein Win

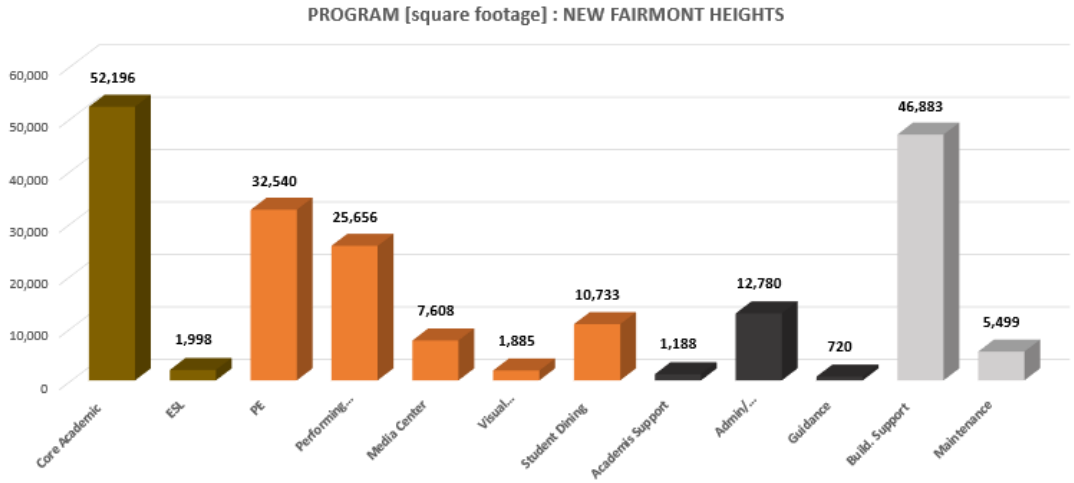


Figure 113: Square footage comparison of each program type, New Fairmont Heights High School.
Chart by May Sein Win

Oxon Hill High School

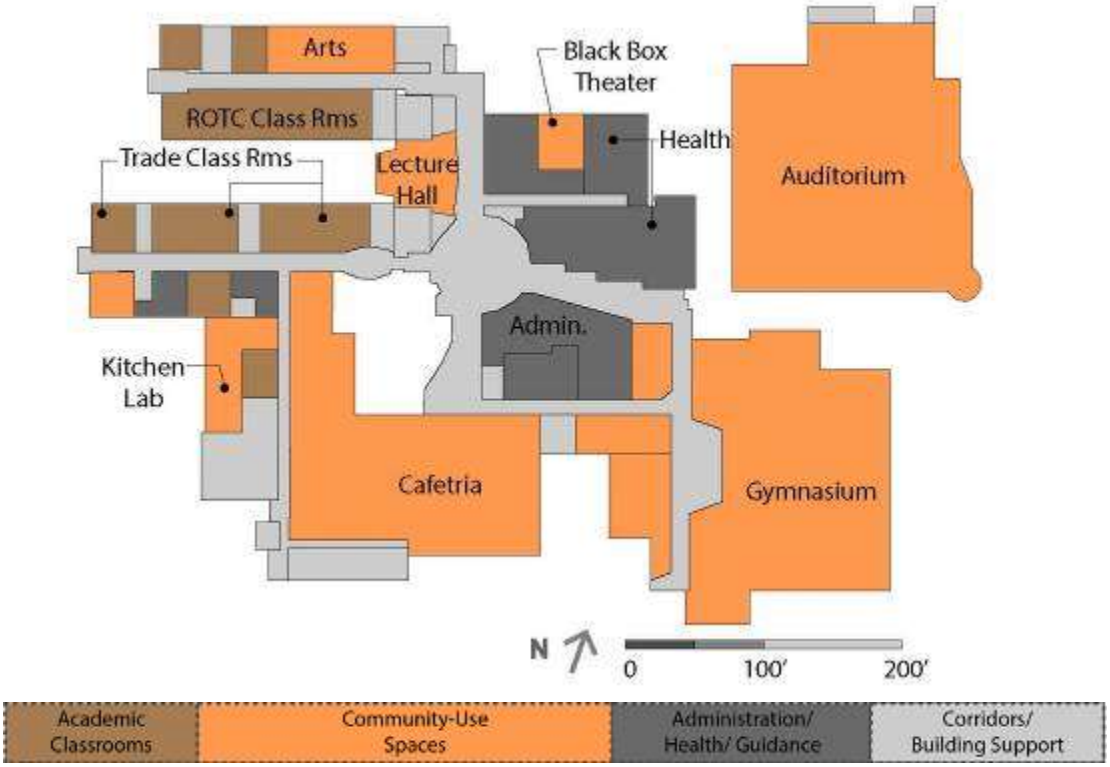


Figure 114: Program analysis of the first floor of Oxon Hill High School
Diagram by May Sein Win

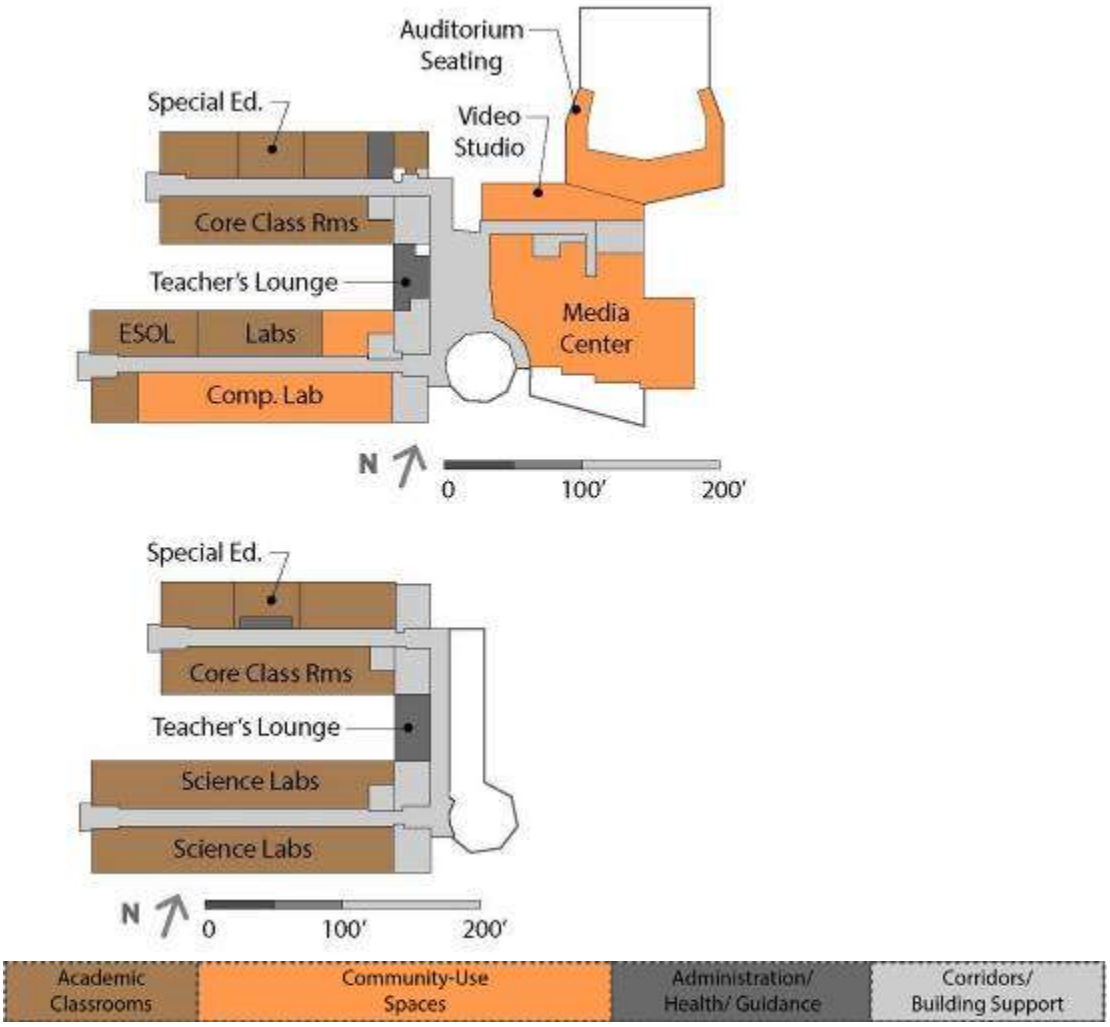


Figure 115: Program analysis of the second floor (top) and third floor (bottom) of Oxon Hill High School
Diagram by May Sein Win

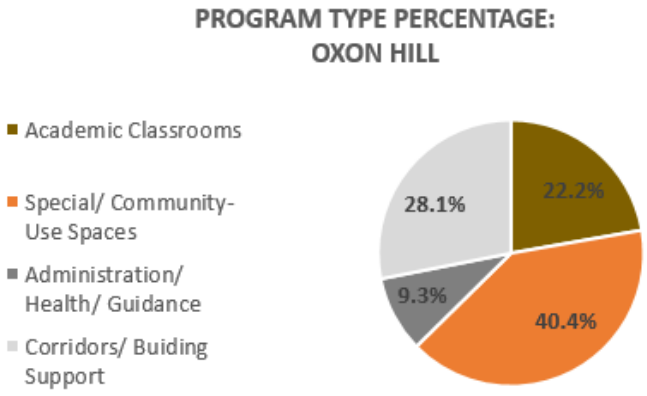


Figure 116: Percentage comparison of program types based on area, Oxon Hill High School
Chart by May Sein Win

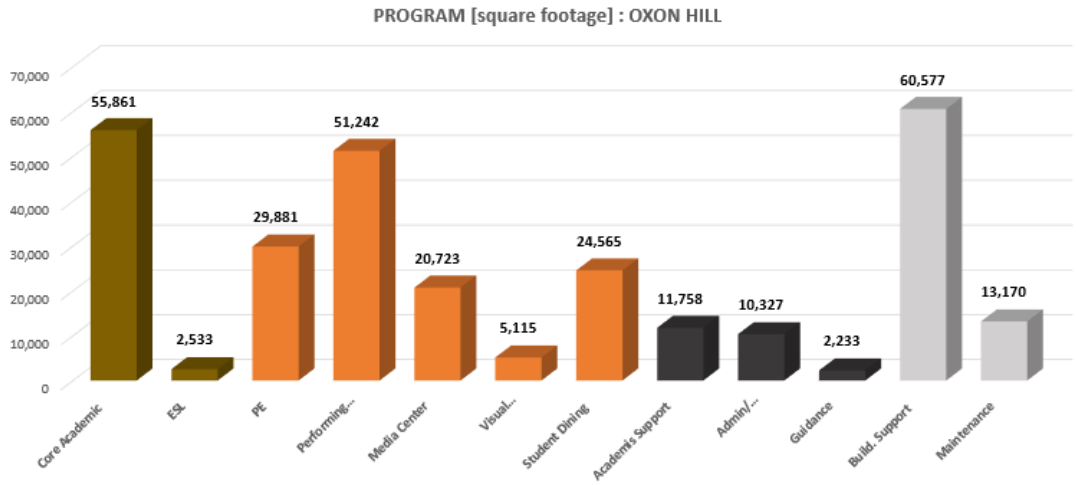


Figure 117: Square footage comparison of each program type, New Fairmont Heights High School.
Chart by May Sein Win

Roosevelt Senior High School

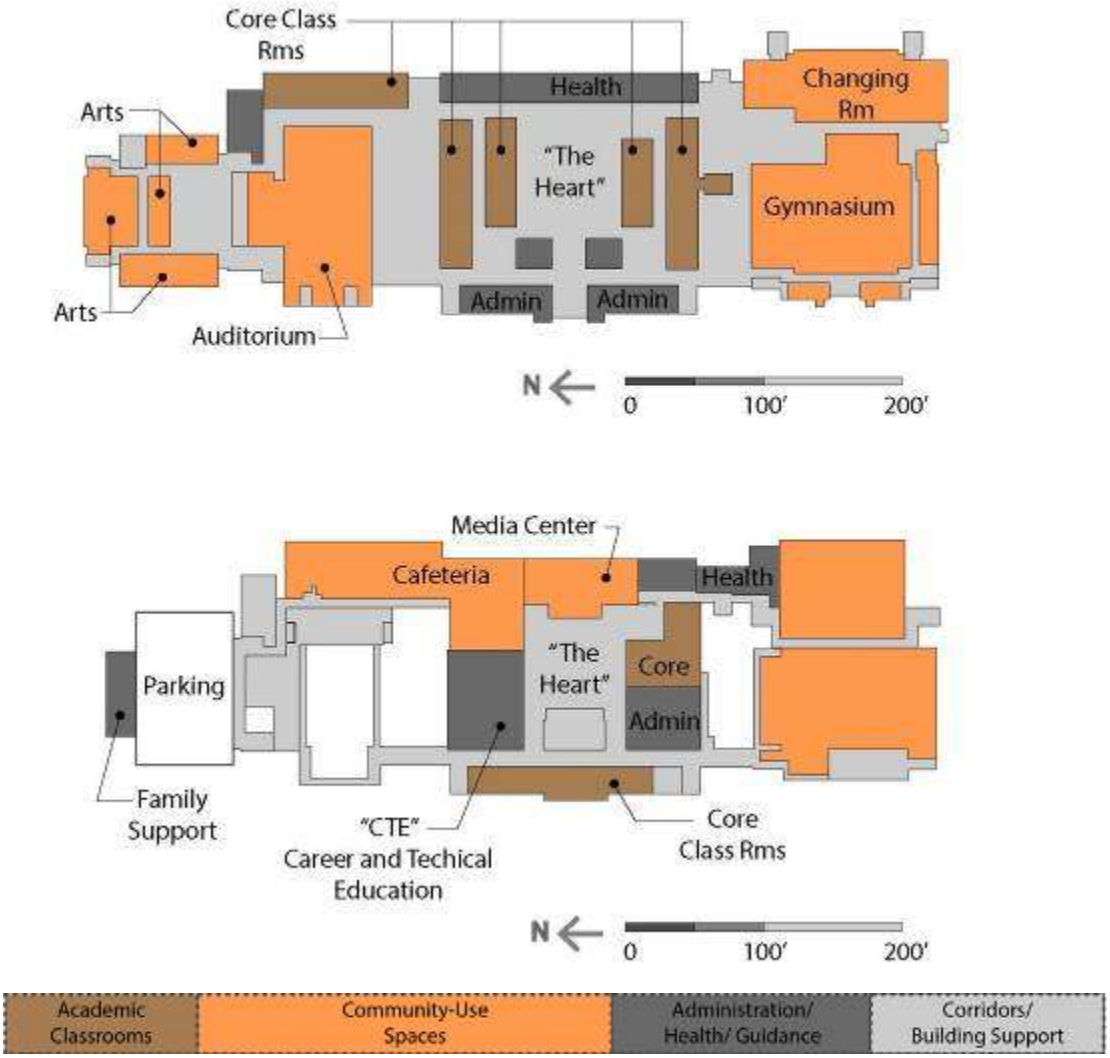


Figure 118: Program analysis the first floor (top) and the ground floor (bottom) of Roosevelt Senior High School
Diagram by May Sein Win

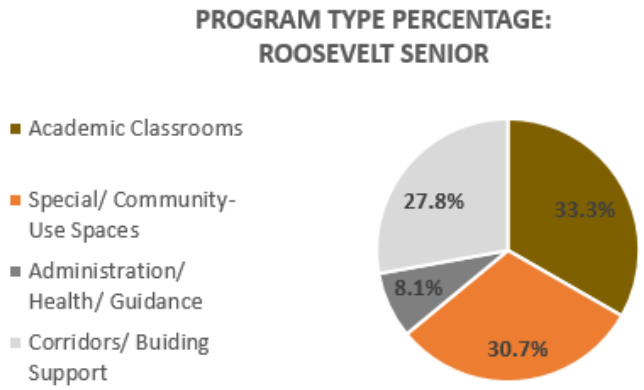


Figure 119: Percentage comparison of program types based on area, Roosevelt Area High School Chart by May Sein Win

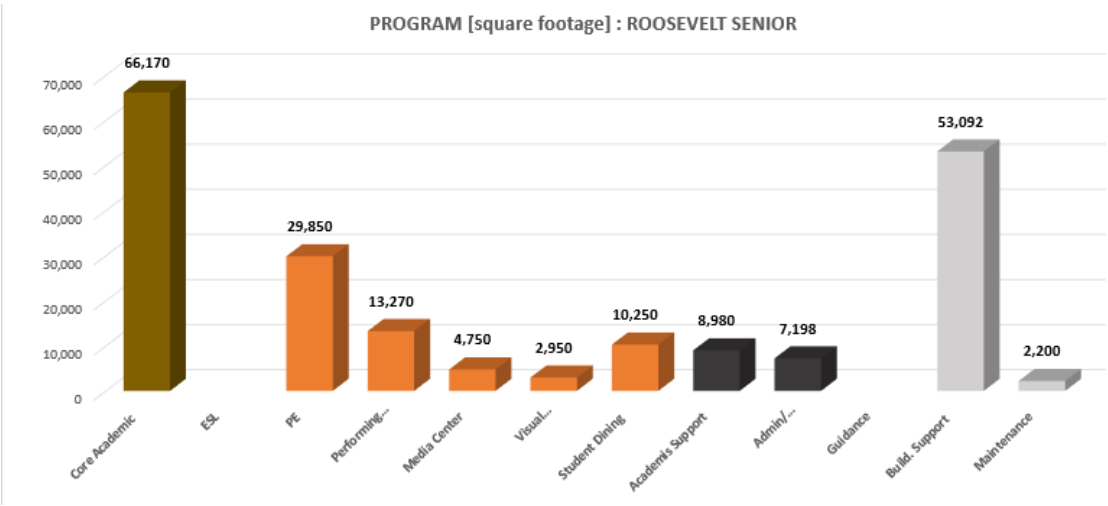


Figure 120: Square footage comparison of each program type, Roosevelt Senior High School. Chart by May Sein Win

Comparison

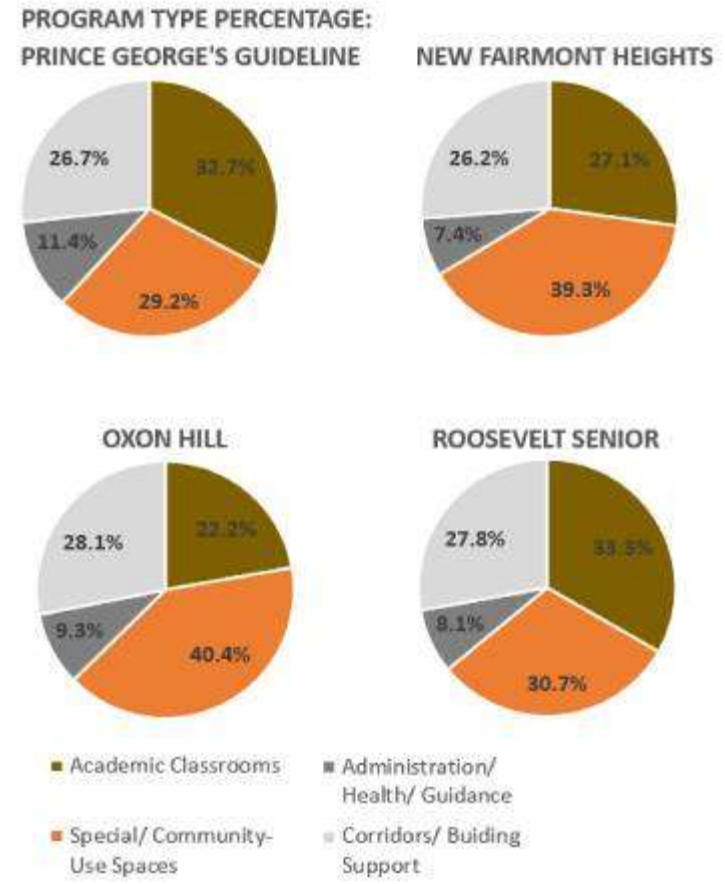
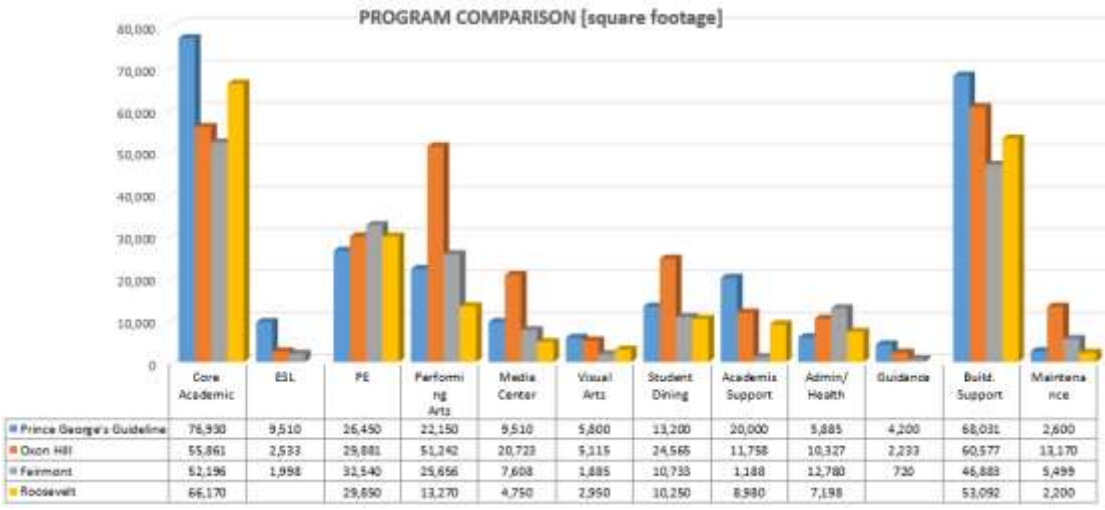
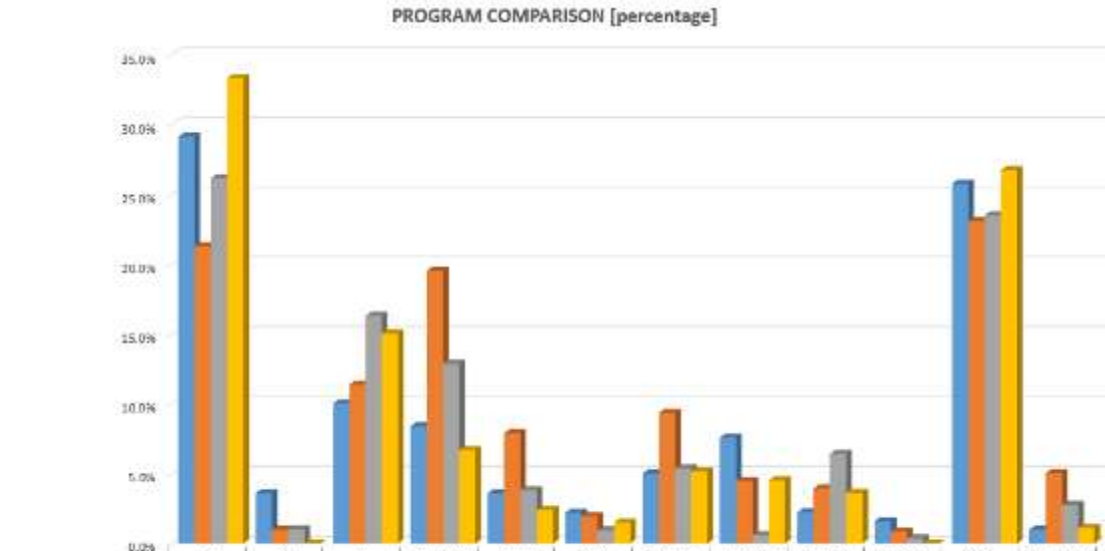


Figure 121: Overall percentage comparison of program types based on area Chart by May Sein Win



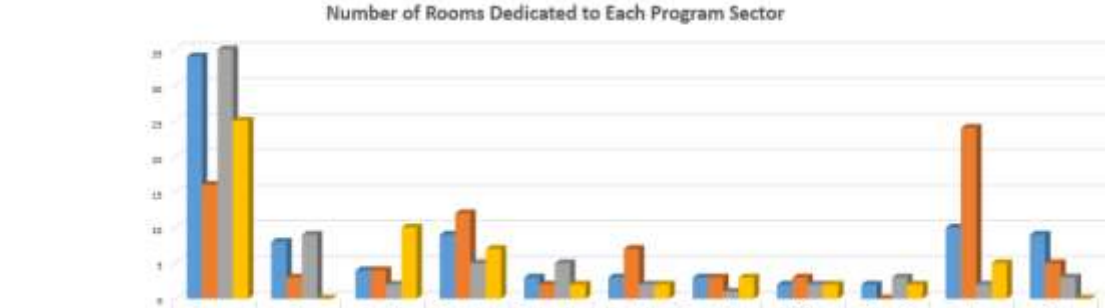
	Core Academic	ESL	PE	Performing Arts	Media Center	Visual Arts	Student Dining	Academic Support	Admin/ Health	Guidance	Build. Support	Maintenance
Prince George's Guideline	76,930	9,510	26,450	22,150	9,510	5,800	13,200	20,000	5,885	4,200	68,031	2,600
Oxon Hill	55,861	2,533	29,881	51,242	20,723	5,115	24,565	11,758	10,327	2,233	60,577	13,170
Fairmont	52,196	1,998	32,540	25,656	7,608	1,885	10,735	1,188	12,780	720	46,883	5,499
Roosevelt	66,170		29,650	13,270	4,750	2,950	10,250	8,980	7,198		53,092	2,200

Figure 122: Overall square footage comparison of each program type Chart by May Sein Win



	Core Academic	ESL	PE	Performing Arts	Media Center	Visual Arts	Student Dining	Academic Support	Admin/ Health	Guidance	Build. Support	Maintenance
Prince George's Guideline	25.1%	3.0%	10.0%	8.4%	3.0%	2.2%	5.0%	7.0%	2.2%	1.0%	25.7%	1.0%
Oxon Hill	21.3%	1.0%	11.4%	19.5%	7.9%	1.9%	9.4%	4.5%	3.9%	0.9%	23.1%	5.0%
Fairmont	26.1%	1.0%	16.3%	12.8%	3.8%	0.9%	5.4%	0.5%	6.4%	0.4%	23.5%	2.8%
Roosevelt	33.3%	0.0%	15.0%	6.7%	2.4%	1.5%	6.2%	4.3%	3.6%	0.0%	26.7%	1.1%

Figure 123: Overall square footage percentage comparison of each program type
Chart by May Sein Win



	Core Academics	Co-teaching/Intensive/ESL	Special Needs/Education	Science Labs	Performing Arts	Visual Arts	Foundations of Technology	PE/ Gym	Other PE (Fitness/ Wrestling)	CTE or Academy electives	Other Electives (Journalism, business)
Prince George's Guideline	34	8	4	9	3	3	3	2	2	10	9
Oxon Hill	16	3	4	12	2	7	3	3	0	24	5
Fairmont	35	9	2	5	5	2	1	2	3	2	3
Roosevelt	25	0	10	7	2	2	3	2	2	5	0

Figure 124: Overall comparison of number of rooms dedicated to each program type
Chart by May Sein Win

Circulation: Precedent Studies

New Fairmont Heights High School

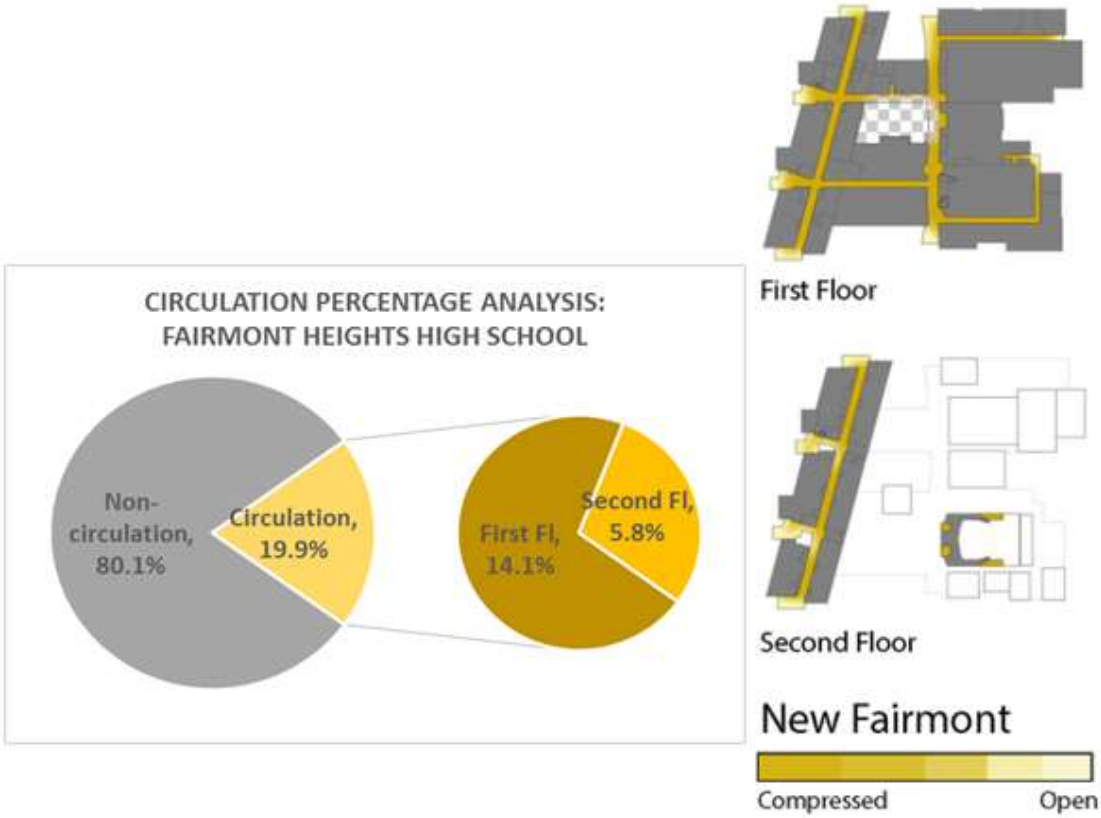


Figure 125: Circulation percentage and compression/expansion analysis, New Fairmont Heights High School. Image by May Sein Win

Oxon Hill High School

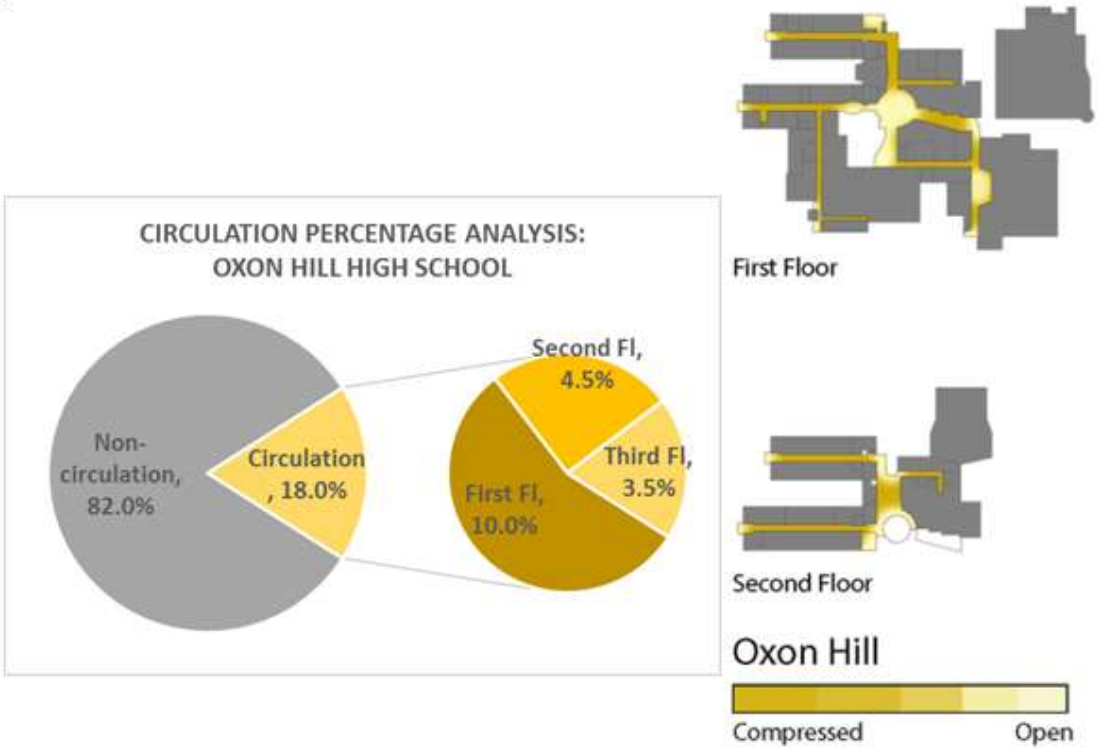


Figure 126: Circulation percentage and compression/expansion analysis, Oxon Hill High School. Image by May Sein Win

Roosevelt Senior High School

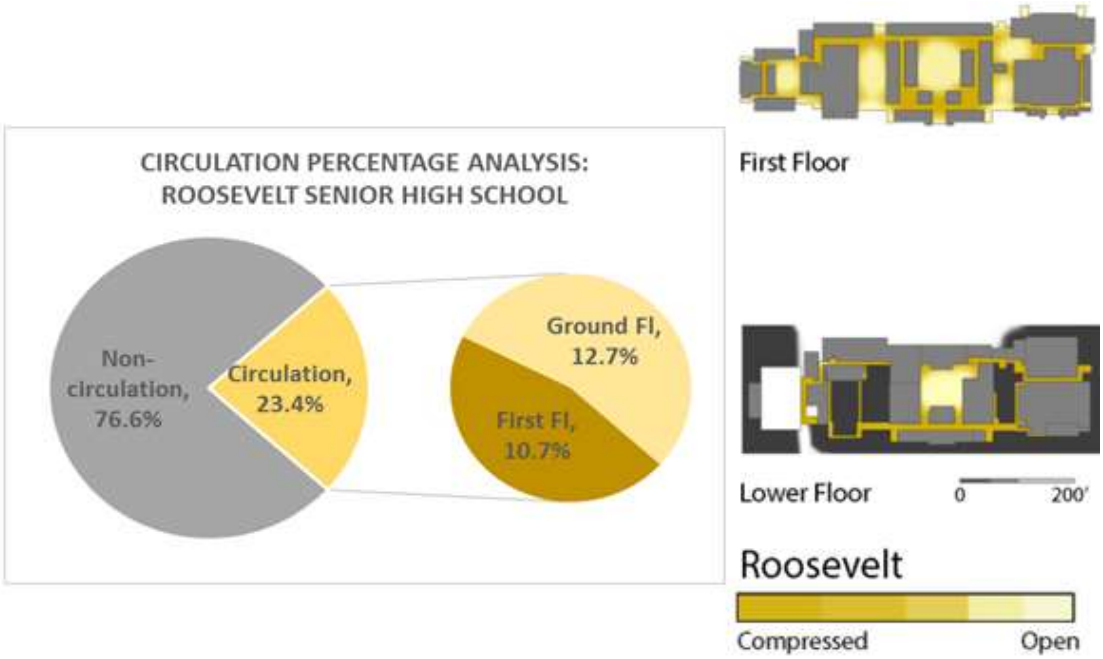


Figure 127: Circulation percentage and compression/expansion analysis, Roosevelt Senior High School.

Image by May Sein Win

Comparison

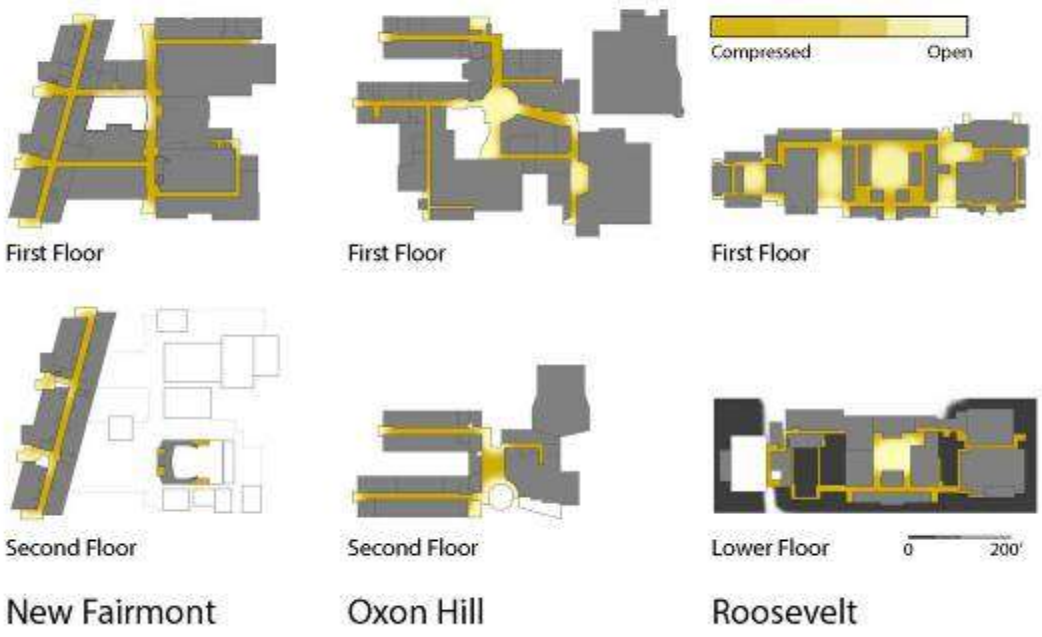


Figure 128: Circulation compression/expansion analysis of precedents
Diagram by May Sein Win

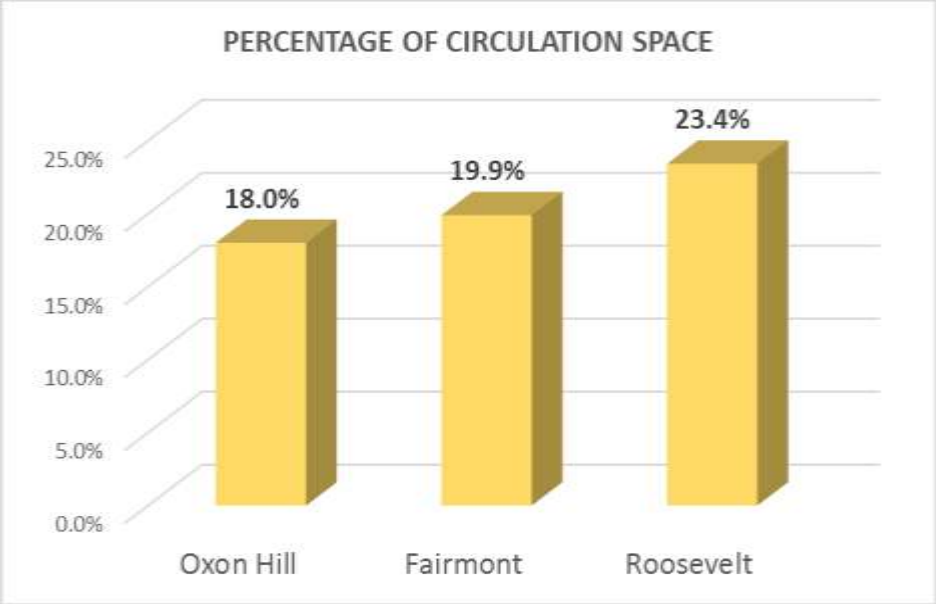


Figure 129: Comparison of circulation percentage of precedents
Graph by May Sein Win

Bibliography

"Alexandria Area High School / Cuningham Group Architecture." ArchDaily, last modified April 5, 2015, accessed January 9, 2016, http://www.archdaily.com/615957/alexandria-area-high-school-cuningham-group-architecture

"Alexandria Area High School." Cuninghan Group Architecture, accessed January 9, 2016, http://www.cuningham.com/projects/education/pre-k-12-education#alexandria-area-high-school

Cherry, Nathan., and Kurt. Nagle. 2009. *Grid/street/place : Essential Elements of Sustainable Urban Districts.* Chicago: Americaanning Associatioanners Press.

Cook, Philip J. and Gottfredson, Denise C. and Na, Chongmin, School Crime Control and Prevention (March 25, 2009). Available at SSRN: http://ssrn.com/abstract=1368292 or http://dx.doi.org/10.2139/ssrn.1368292

Cotterell, John. 1984. "Effects of School Architectural Design on Student and Teacher Anxiety." *Environment and Behavior* 16 (4): 455-479.

Crawford, Charles, and Ronald Burns. 2015. "Preventing school violence: assessing armed guardians, school policy, and context." *Policing* 38, no. 4: 631-647. *Academic Search Complete*, EBSCO*host* (accessed December 2, 2015).

"Data Prince George's," Prince George's County, last modified November 20, 2015, accessed November 21, 2015, https://data.princegeorgescountymd.gov/browse?category=Public+Safety

Dotson, R. G. 2015. "Keys to Safety." *American School & University* 87, no. 9: 30-33. *Academic Search Complete*, EBSCO*host* (accessed December 2, 2015).

"Dunbar High School." Perkins Eastman, Accessed January 9, 2016. http://www.perkinseastman.com/project_3405944_dunbar_high_school

Eklund, Katie, Kris Bosworth, and Sheri Bauman. 2015. "Promoting Safe Schools for All Students." In *Prevention Science in School Settings: Complex Relationships and Processes*.307-333. New York, NY: Springer New York : Springer. Advances in Prevention Science. doi:10.1007/978-1-4939-3155-2_15.

Ferguson, Kim T., Rochelle C. Cassells, Jack W. MacAllister, and Gary W. Evans. 2013. "The Physical Environment and Child Development: An International

Review." *International Journal of Psychology* 48 (4): 437-468. doi:10.1080/00207594.2013.804190.

Ginns, Paul, Andrew J. Martin, and Brad Papworth. 2014. "Student Learning Theory Goes (Back) to (High) School." *Instructional Science: An International Journal of the Learning Sciences*42 (4): 485-504.

"Grunley Begins Construction on $78.8M Fairmont Heights High School Replacement Project." Grunley, last modified August 10, 2015, accessed December 10, 2015, http://www.grunley.com/news/2015/08/grunley-begins-construction-788m-fairmont-heights-high-school-replacement-project-0

Jacobs, Jane. 1961. *The Death and Life of Great American Cities.* New York: Random House.

Johnson, Genevieve Marie. 2014. "The ecology of interactive learning environments: situating traditional theory." *Interactive Learning Environments* 22, no. 3: 298-308. *Academic Search Complete*, EBSCO*host* (accessed December 3, 2015).

Kaiser, Laura Fisher. 2013. "Tackling Safety Through Design." *Architectural Record* 201, no. 3: 38. *Business Source Complete*, EBSCO*host* (accessed December 2, 2015).

Kennedy, Mike. 2015. "Keeping Campuses Safe." *American School & University* 87, no. 6: 20-23. *Academic Search Complete*, EBSCO*host* (accessed December 2, 2015).

Lindle, Jane. 2008. "School Safety." *Educational Policy* 22 (1): 28-44.

Locastro, Virginia. 1994. "Learning Strategies and Learning Environments". *TESOL Quarterly* 28 (2). Teachers of English to Speakers of Other Languages, Inc. (TESOL): 409–14. doi:10.2307/3587445 (accessed December 3, 2015).

Maring, Elisabeth F., and Sally A. Koblinsky. 2013. "Teachers' Challenges, Strategies, and Support Needs in Schools Affected by Community Violence: A Qualitative Study." *Journal of School Health* 83 (6): 379-388. doi:10.1111/josh.12041.

Nance, Jason P. 2013. "STUDENTS, SECURITY, AND RACE." Emory Law Journal 63, no. 1: 1-57. Academic Search Complete, EBSCOhost (accessed December 2, 2015).

Nolen, Susan Bobbitt. 2003. "Learning Environment, Motivation, and Achievement in High School Science." *Journal of Research in Science Teaching* 40 (4): 347-368. doi:10.1002/tea.10080.

"Population Density," PGAtlas, last modified January 6, 2016, accessed January 7, 2016, http://www.pgatlas.com/

"QuickFacts: Prince George's County, Maryland," United States Census Bureau, accessed November 29, 2015, http://www.census.gov/quickfacts/table/PST045214/24033,24

Schelfhout, Wouter, Filip Dochy, Steven Janssens, Katrien Struyven, and Sarah Gielen. 2006. "Towards an equilibrium model for creating powerful learning environments. Validation of a questionnaire on creating powerful learning environments during teacher training internships." *European Journal of Teacher Education* 29, no. 4: 471-503. *Academic Search Premier*, EBSCO*host* (accessed December 3, 2015).

Simmons, Lizbet. "Profiting from Punishment: Public Education and the School Security Market." *Social Justice* 41, no. 4 (December 2015): 81-95. *Academic Search Complete*, EBSCO*host* (accessed December 2, 2015).

Smith TJ. 2007. "The ergonomics of learning: educational design and learning performance." Work *(Reading, Mass.)* 50:10, 1530-1546, DOI: 10.1080/00140130701587608.

Smith TJ. 2013. "Designing Learning Environments to Promote Student Learning: Ergonomics in All but Name." *Work (Reading, Mass.)* 44: S39-60. doi:10.3233/WOR-121493.

"State & County QuickFacts: Maryland County Selection Map" United States Census Bureau, accessed November 29, 2015, http://quickfacts.census.gov/qfd/maps/maryland_map.html

Timm, Paul. School Security: How to Build and Strengthen a School Safety Program. Saint Louis: Elsevier Science, 2014. http://UMDCP.eblib.com/patron/FullRecord.aspx?p=1793945 (accessed December 03, 2015)

"VERSTAS Architects' Saunalahti School Exemplifies Finnish School Architecture." Archinect, last modified July 24, 2013, accessed November 10, 2015, http://archinect.com/news/article/77844999/verstas-architects-saunalahti-school-exemplifies-finnish-school-architecture

Yang, Fang-Ying, and Cheng-Chieh Chang. 2009. "Examining high-school students' preferences toward learning environments, personal beliefs and concept learning in web-based contexts." *Computers & Education* 52, no. 4: 848-857. *Academic Search Complete*, EBSCO*host* (accessed December 3, 2015).